The Chemical Age

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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemistry in the XX Century

IF the various contributions which are to constitute the forthcoming work on *Chemistry in the XX Century* are as good as the general introduction which Dr. E. F. Armstrong has written, the volume should be one of rare excellence and interest as a statement of the present position of chemical science. We have had an opportunity of seeing Dr. Armstrong's proofs. The extracts from them published in this issue are extracts only, merely giving passing glimpses of what he says. It would have been useless to attempt a summary of what in itself is a summary of the most condensed and compact type. It is the kind of work one would expect from one who has no use for words except to convey ideas and facts. The result is a piece of writing with real body and weight in it.

Essentially a chemist himself, constantly insisting that the chemist, whatever else he knows, shall first of all be master of the principles of his own science, Dr. Armstrong turns naturally in the first place to the field of pure research. Here the chemist is in his true element, working down to the very foundations of life and matter, always on the verge of the unknown, inspired by hopes that constantly tantalise but occasionally materialise into real gains. It is fascinating work, this constant fight with Nature, to which many minds have unselfishly dedicated themselves, and now and again there comes a stage when their collective efforts bring us to a new starting-point. Something of this is in Dr. Armstrong's mind as he examines the problems and marks the advances made.

Remote as all this seems from business and material interests, the fundamental discoveries made ultimately react powerfully on industry and indeed on civilisation. The mere recital of the examples of applied chemistry which Dr. Armstrong gives is impressive. Not merely the layman but the scientist himself is apt, in the absence of such reminders, to forget how rapid contemporary progress is. It is a safe conclusion to which all this leads that "if the world could afford to subsidise research on the same scale during a decade under peace conditions as it did during the war our rate of progress would be beyond all belief."

The volume referred to, like another in the "Resources of the Empire" series dealing with chemistry, is expected to be out about the end of this month. The latter volume, compiled by Mr. Ashe and Mr. Boorman) of the staff of Messrs. Chas. Page and Co.), with the advice and assistance of the General Manager of the A.B.C.M., contains a wealth of information of immediate interest to chemical manufacturers and merchants, and although not connected with the other enterprise, should prove a valuable companion to the record of purely scientific research which has made these productive and distributive activities possible.

B.D.C.'s Further Progress

THE British Dyestuffs Corporation may be congratulated on the further and most encouraging progress made during the past year. When Sir William Alexander took charge of affairs there were many who confidently predicted that his task was hopeless. He did not himself, we imagine, regard it as a picnic. Yet his efforts to evolve order out of chaos and to bring the concern to a sound commercial position have already proved so effectual that last year a profit was shown of £102,657, after providing £411,382 for depreciation. This year, after providing £360,025 for depreciation, the profit is the considerably larger sum of £251,422. It is obvious that, if only the present rate of progress is maintained over a few years, the B.D.C. will have wiped out its deficit, a steadily diminishing burden, and will have a clear course. Good as the report is, it is pretty sure to excite the usual "nagging." We shall probably hear it suggested that immediate commercial progress has been attained at the expense of future provision for research, just as, if there had been no commercial progress, the same critics would have claimed the fact as evidence of inefficient management. The fact that really governs the situation is that if the concern cannot be made to pay, research, with all the

other interests involved, must go under. The fact that the concern is being made to pay means the survival of a national dyestuffs research school as part of the survival of the whole industry.

A brief reference is made to the suggested working arrangement between the Corporation and the German I.G. The directors state that representatives of both concerns have on several occasions discussed the possibility of a close working arrangement, and offer a general assurance that no scheme will be approved which does not provide " complete security for the progress of your undertaking, both in research and manufacture." These questions, together with that of reconstructing the capital of the company, are to be discussed at the annual meeting on April 8. In whatever is done it is to be hoped that the unity of the entire dyestuff industry will not be overlooked and that no effort will be spared to maintain an amicable understanding between the Corporation and the other British dyestuff manufacturers.

Safety-First and the Carboy

THE glass carboy, except in those instances where large quantities are concerned, is still the most commonly employed container for the transport of acids and other corrosive liquids. Within recent years this familiar vessel has met with a good deal of criticism at the hands of the " Safety-First " campaigners, and although it is difficult to think of any other appliance which would be as suitable and convenient it must be admitted that the condition in which carboys are sometimes sent on their journeys does not exhibit any great appreciation of the risks involved. In the matter of ensuring safety it is not so much the condition of the carboy, its basket, or packing which are most likely to offend, for such things are too obvious to escape attention. It is in some of the less apparent details that the risks are mostly involved, and perhaps the most important of these is the method of sealing the earthenware stopper.

In this country we still seem to be content with the primitive stopper sealed up with a pug of plaster; but in America they have recently gone further and have developed a new type of seal which has been adopted as a standard. This consists of a compressible gasket of acid-resisting material combined with a porous earthenware stopper, which is leak-proof, but which, on the other hand, permits of no pressure being built up within the carboy. In addition, the neck is provided with a mechanical metal seal which maintains the stopper in position. Apart from the security which such a device provides, there is the additional advantage that the porous nature of the stopper precludes any accumulation of pressure, accordingly all danger arising from over-filling is eliminated. Since the commencement of last year conformity with some fairly drastic provisions is necessary in connection with all plants or works where carboys are used in America, the regulations applying not only to the condition of the carboys but to the methods employed for sealing. Twice each year, in fact, service tests of all carboys in use have to be made in the presence of one of the Bureau of Explosives inspectors. So far in this country we seem to be fairly free from official interference in this respect, but from suggestions which have been dropped by members of the present Government it would seem that before long there will be a pretty general tightening-up of the legislation relating to factories and the protection of workers therein. Possibly, therefore, chemical engineers might find it profitable to take up the matter of acid transport and so forestall, or prepare to meet, any compulsory regulations which may be forced on them without much grace from the point of view of time.

Chemical Headquarters' Scheme

THE review by Mr. G. S. W. Marlow, assistant secretary of the Institute of Chemistry, of the present organisation of the various chemical societies and of the proposal for establishing a central chemical headquarters is the most exhaustive examination of the subject we have yet seen. The question is admittedly large, there is a group of allied or overlapping interests to be accommodated, and the cost must be considerable. The subject will require to be approached, not only with courage, but with imagination and a long forward vision. All these difficulties are fully recognised by Mr. Marlow, but he refuses to regard them as insuperable. On the other hand, instead of trusting to a benevolence that may be unequal to the need or entertaining a hope that chemists are prepared to find £25 a head in donations, he suggests that the problem of Chemistry House might be approached as a business proposition, that a separate company with a capital of about £300,000 should be floated, and that a building should be secured or built, with space beyond the requirements of the existing societies which might be let. Here at any rate the thing is reduced to a concrete form, and one interesting point at once emerges. The housing of all the chemical organisations in one building on a commercial basis does not necessarily involve the merging of existing societies into one body; they might live in one home to the great advantage of all without losing their identity. Whether this would commend or discredit the scheme with the promoters one cannot say, but at least it raises a first question—whether central housing is to be the sole object or central housing plus some kind of amalgamation. Probably it might simplify matters to consider housing alone in the first instance—it is, in fact, the first difficulty to be solved—and to treat the possibilities of amalgamation as a later problem. Mr. Marlow seems to us to have done quite a useful piece of work in providing a sort of ground plan of the whole problem.

A New Basis for Coal Classification

THE suggestion has often been made, with a good deal to commend it, that fuel users should purchase their coal on the basis of its heat content. Hitherto the suggested basis has been thought of in terms of calorific or British thermal unit content, but a new basis has been put forward by an eminent authority in America, Mr. George H. Ashley, who suggests that coal should be classified according to its fixed carbon content. In brief his proposal is that all coals of the bituminous type should be graded on the percentage of fixed carbon in a " standard classification analysis," which may be defined as an analysis recalculated, if necessary, to

7 per cent. ash, and one in which, if necessary, moisture has been determined at a temperature of 68 deg. F. and at a pressure of 15 mm. of mercury vapour.

According to Mr. Ashley's proposal commercial coals would fall into ten classes as follows: anthracite 83 or more per cent. fixed carbon; semi-anthracite, 80-82 per cent.; semi-bituminous, 74-79 per cent.; low-volatile smokeless bunker, 65-73 per cent.; medium volatile coking by-product, 60-66 per cent.; high-volatile gas, 53-59 per cent.; high-volatile, 46-52 per cent.; high-volatile sub-bituminous, 39-45 per cent.; sub-bituminous, 32-38 per cent.; and lignite, 25-31 per cent. Each of these coals would be given a special trade name and number for convenience of reference.

Various classifications have been put forward from time to time, but these all grade coal according to its type, whereas the same type of coal from different mining areas will bear very little resemblance. Even splint coals are of two types, one being dull and heavy, apparently consisting entirely of plant attritus common to the dull strata of common coal, and the other reveals in cross-section thin layers of bright intermixed with the dull. It is claimed that by this plan all coals can be classified as closely as ninety-nine out of one hundred users need, with little expense or chemical analyses, as the grade is determined by the percentage of fixed carbon and ash alone. The Coal Mining Institute of America has appointed a committee of eminent fuel technologists to confer with Mr. Ashley and report on coal classification.

The Oppau Explosion

THE meeting of the Faraday Society to be held on Monday, April 14, at 8 p.m., in the rooms of the Chemical Society, promises to be of exceptional interest. The programme will include a report on an investigation of the chemical, physical and explosive properties of Oppau ammonium sulphate-nitrate by Sir Robert Robertson and Dr. G. Rotter, with appendices by Dr. H. H. Thomas, Mr. A. L. Hallimond, and Sir William Bragg. A short introduction by Sir Richard Threfall will precede the report, giving briefly the conclusions of the Chemistry Research Board as to the causes of the Oppau explosion, which took place on September 21, 1921. Advance copies of the papers will be available (price 2s. to non-members) and application for them should be made to the Faraday Society, 10, Essex Street, Strand, W.C.2.

Official Chemical Appointments

TWELVE years have passed since the fourth edition of the Institute of Chemistry's invaluable handbook, *Official Chemical Appointments*, was issued. Published first in 1906 revised editions appeared regularly every two years up to 1912. Up to now no further edition has been issued and the reappearance is welcome. The disorganisation of scientific staffs during the war, it is explained, has rendered the earlier production of the fifth edition practically impossible; the general scheme remains unchanged, the information has been carefully corrected, and many additions have been made. This fifth edition emphasises still further the steadily increasing demand for and appreciation of professional chemical services in connection with governmental and municipal administration, while the lists of institutions where chemistry is taught bear evidence of the progress made in the promotion of scientific education. The work of revision had again been done by the Registrar, which is only another way of saying that it has been done with great thoroughness. It might very well serve as a model for all such compilations.

Points from Our News Pages

Mr. L. Andrews described an ingenious kinetic elutriator before a meeting of the Chemical Engineering Group (p. 346.)

Mr. G. S. W. Marlow, assistant secretary to Institute of Chemistry, in a series of recent addresses to Sections dealt with the various proposals that have been made for a central headquarters for chemistry and made a number of suggestions (p. 350).

A report is published of the Chemical Society's annual meeting, and of a very successful informal dinner (p. 352).

According to our London market report, though business has been quiet some Continental prices show a marked upward tendency (p. 364).

There has been a slight improvement during the week in the Scottish chemical market. (p. 367).

Books Received

TUNING COILS AND HOW TO WIND THEM. By G. P. Kendall London: Radio Press, Ltd. Pp. 68. 1s. 6d.

COLLOID CHEMISTRY. By The Svedberg, New York: The Chemical Catalog Co., Inc. Pp. 266.

WIRELESS SETS FOR HOME CONSTRUCTORS. By E. Redpath, London: Radio Press, Ltd. Pp. 130. 2s. 6d.

OFFICIAL CHEMICAL APPOINTMENTS. London: The Institute of Chemistry of Great Britain and Ireland. Pp. 312.

500 WIRELESS QUESTIONS ANSWERED. By G. P. Kendall and E. Redpath. London: Radio Press, Ltd. Pp. 134. 2s. 6d.

The Calendar

Apl.		
7	Society of Chemical Industry (London Section): Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London.
7	Institution of the Rubber Industry: "Solid Tyres." W. Bond. 8 p.m.	The Engineers' Club, Coventry Street, London.
8	Institute of Metals (Birmingham Section): Annual General Meeting. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
8	West Yorkshire Metallurgical Society: Discussion on "Engineering and Metallurgical Specifications."	Huddersfield.
8	Institute of Metals (N.E. Coast Section): Annual General Meeting. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
8	Institution of Petroleum Technologists: "The Crude Oils of Burmah and Assam." W. J. Wilson. 5.30 p.m.	House of Royal Society of Arts, John Street, Adelphi, London, W.C.2
10	Royal Society: Papers by Professor T. H. Havelock, J. H. Jones, and others. 4.30 p.m.	Burlington House, Piccadilly, London
10	Institute of Metals (London Section): "Failures in Metals and Alloys." Dr. G. H. Gulliver. 8 p.m.	85–88, The Minories, Tower Hill, London.
11	Royal Institution of Great Britain: "Colours, Stains and Dyes." Dr. Dr. Jocelyn Thorpe. 9 p.m.	21, Albemarle Street, London, W.1.
11	Institute of Metals (Sheffield Section): Annual General Meeting. 7.30 p.m.	The University, St. George's Square, Sheffield.
12	Mining Institute of Scotland: Annual Meeting.	Glasgow.
14	Faraday Society: Report on the Examination of Oppau Ammonium Sulphate-Nitrate. 8 p.m.	Burlington House, Piccadilly, London
15	Hull Chemical and Engineering Society: Annual General Meeting. 7.45 p.m.	Hull Photographic Society's Rooms, Grey Street, Hull.

Conference on Problems in Kinetic Elutriation

Discussion before the Chemical Engineering Group

At a meeting of the Chemical Engineering Group of the Society of Chemical Industry held at the Institution of Civil Engineers in London on Friday, March 28, a paper was read by Mr. Leonard Andrews on "Kinetic Elutriation."

The lecturer explained that elutriation was the hydraulic classification of powders, and dealt in some detail with the physical principles applied in an elutriator, in which powder was admitted midway in an upward stream of liquid. The velocity of settling depended theoretically on Stokes' law, and was proportional to the square of the radius of the particles and inversely to the viscosity of the fluid. In practice Stokes' law did not apply to particles larger than 0·1 mm. in diameter, with larger particles eddy currents were formed.

Factors Affecting Separation

There were several other factors affecting the velocity of bodies falling in water. The resistance between solid and fluid depended greatly upon the extent to which the solid was wetted—*i.e.*, upon the adhesion or interfacial tension between the solid and fluid. Munroe found that a large number of spheres falling *en masse* fell with only one-tenth of the velocity of free falling spheres. Professor Perry found that the resistance decreased rapidly with rise in temperature. Professor Lowry also found that the size of the particle carried by water flowing at a given velocity was increased by reducing the temperature of the water, but not to the extent that the viscosity of the water was increased by a corresponding reduction of temperature. Mr. Sulman had shown that interfacial tension is usually increased by reduction of temperature. The extent to which the particle was wetted would thereby be reduced, possibly resulting in a reduction of the volume of minute air bubbles adhering to the particles, and thus reducing their buoyance.

In view of the widely varying forces to be considered it was practically impossible to predict, without experiment, the sizes of particles of different powders that would be carried by a stream of water of any given velocity. Fortunately, it was unnecessary to attempt to do so in connection with industrial elutriation as the velocity might be adjusted until the desired maximum or minimum size of particle was obtained at each outlet of the plant. It was obviously important, however, that the design of the elutriator should be such as to provide for adjustments of the velocities at different points in the apparatus without altering the velocities at other points.

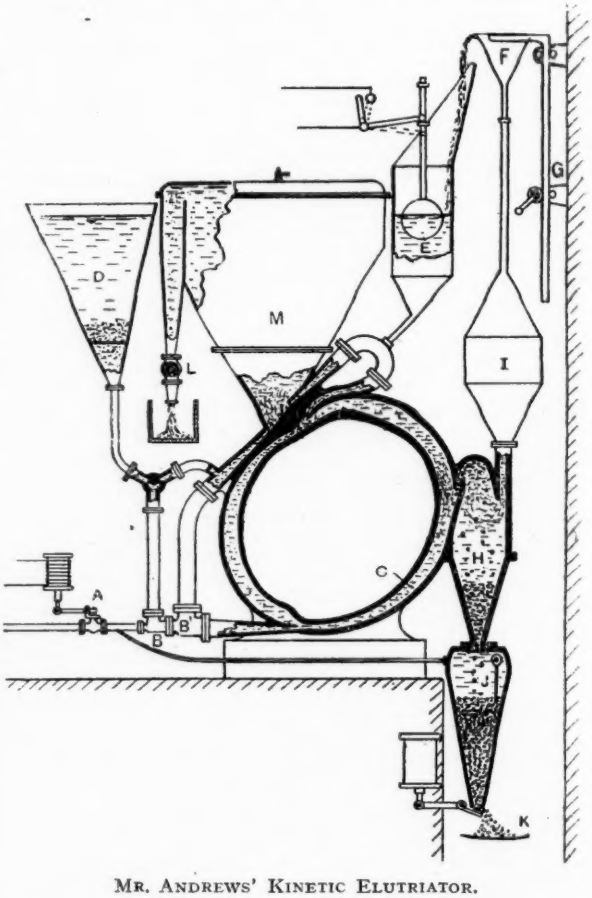
If a simple experiment was performed with fine powders such as Fullers' earth in water, it was found that the particles always fell with a velocity greater than the theoretical. This seemed to be due to a layer of water round each particle which was carried down with it, increasing its effective size.

Mr. Andrews then passed on to consider various commercial forms of elutriators. Apart from gravitational elutriation (which was very slow) and centrifugal elutriation, the powder to be graded was best forced horizontally into a tank, so that the heavier particles fell more rapidly to the bottom and the lighter ones more slowly, and so were separated, because they were at the same time carried horizontally in virtue of their original velocity. The author then described a practical elutriator of his own design in detail.

Description of the Elutriator

In this apparatus water under pressure is supplied intermittently through the automatic valve A and the multi-stage ejector BB¹ to the annular vortex chamber C, thereby imparting a rotational velocity to the water in this chamber. During the periods when the supply of water under pressure is interrupted the free water surfaces in the feed hopper D, the float tank E, and in the overflow delivery pipe F, will all stand at the same level, but immediately the automatic valve opens, the centrifugal force of the rotating water in the vortex chamber will raise the level of the water in the overflow pipe whereas the partial vacuum induced in the suction pipe of the first stage ejector B will tend to lower the level of water in the feed hopper.

The overflow tank F may be raise by the rack and pinion G until the increased static head of the water in the raised tank just balances the kinetic head resulting from the rotational velocity of the water in the vortex chamber, when the flow through the delivery pipe will cease. If, however, solid material heavier than water is now allowed to flow into the elutriator from the feed tank, the density, and hence the mass of the rotating fluid in the vortex chamber, will be increased, thereby increasing the kinetic head and causing water again to flow into and out of the raised overflow tank.



Mr. Andrews' Kinetic Elutriator.

The coarsest and heaviest particles of solid material will be discharged more readily by the centrifugal force of the fluid in the vortex chamber than the smaller particles in view of their greater mass and similar velocity, and these heavy particles will tend to gravitate to the bottom of hopper H. It is necessary to allow some water, and consequently some of the fine particles in suspension, to flow with the coarse material into H, but this water will flow up the delivery pipe to the overflow tank and be discharged therefrom into the float tank. To avoid intermediate coarse particles also being carried to the overflow tank an expansion chamber I is inserted in the delivery pipe which, by reducing the velocity of flow, limits the size of particles carried through it. During the half period that the supply of high pressure or motive water is discontinued the circulation of water in the vortex chamber ceases and the kinetic head falls to zero, with the result that the water accumulated in the overflow tank ebbs, returning through the expansion chamber until the levels in overflow tank and float tank are equal. This reversal of flow carries any intermediate coarse particles that may have accumulated in the bottom of the expansion chamber back

into hopper H. The fine material is prevented from returning by so limiting the capacity of the overflow tank that only a small volume of water returns before equal levels are attained, when the return flow ceases. To prevent any of the fine particles passing through hopper H from descending into the final coarse hopper J, a small stream of water is caused to flow upwards through the narrow channel interconnecting the two hoppers, which upward flowing stream also agitates the material settling at the bottom of H, effectually carrying up any fine particles and causing the heaviest particles to work to the bottom of the hopper. This auxiliary stream is supplied through a small branch pipe from the main supply to the ejector and is therefore also intermittent. When the flow is interrupted the coarsest and cleanest material gravitates into the final hopper. It has been stated that there are practically no hydraulic classifiers which do not allow some of the fine material to escape with the coarse. It can be demonstrated however that the coarse material descending into hopper J is entirely free from fine particles as is evidenced by the clearness of the water in J in marked contrast to that in H, which is densely crowded with suspended matter. The coarse material is discharged from J through an electrically operated gate on to a belt conveyor K by means of which it is drained of surplus water and is returned to the feed of the grinding mill. The material leaving the conveyor has been found to contain less than 25 per cent. of water.

Function of the Vortex Chamber

Ruturning now to the vortex chamber it is obvious that only a small proportion —and that the largest and cleanest coarse particles—will be discharged by centrifugal force into hopper H, the balance, including the bulk of the fine material and aggregations of coarse and fine, will be carried on by the viscosity of the water and circulated round and round the vortex chamber. Since a considerably greater volume of water is flowing in than is discharged into H, the surplus water must escape through some other outlet. This second outlet is connected tangentially to the top of the vortex chamber in a reverse direction to the vortex flow. The momentum of the coarse particles in the vortex stream carries them past the latter outlet, but the fine particles are carried by the viscosity of the outward flowing stream into the syphon chamber through a nozzle—thus gaining velocity. The syphon chamber is provided with an outlet directly opposite the inlet nozzle, which outlet is connected to the suction inlet of the second stage ejector B^1, with the result that any coarse or intermediate particles that may have been carried up with the fine material are now carried by their momentum directly across the bottom of the syphon chamber. The area of the outlet relatively to the inlet nozzle is so proportioned that the velocity at which the water leaves the syphon chamber is very much lower than that at which it enters, and the impact of the high velocity water upon the low induces eddy current or a rotational velocity which carries the fine material up into the syphon stream but is insufficient to divert the coarse particles from their direct course. The velocity of the syphon stream is controlled by the valve L. This flow, which is continuous and entirely unaffected by the intermittent velocities in other parts of the system, determines both directly and indirectly the maximum size of the particles carried by the main overflow.

The connection between the coarse outlet from syphon chamber and suction inlet of the second stage ejector B^1 is branched to communicate, through a three-way valve, with the suction inlet of the first stage ejector B, and with the feed hopper. The position of this three-way valve regulates the rate of flow of solid material relatively to the flow of water. The feed hopper is provided with a twenty-mesh sieve which, in addition to holding up any coarse material, etc., exceeding 0·65 mm. diameter, breaks up the flocculated material into aggregations not exceeding 0·65 mm. diameter. These aggregations are further subdivided by hydraulic erosion and by the repeated impact with each other caused by the many changes of direction and velocity in their passage through the system. As previously mentioned, water in the feed hopper ebbs and flows with the intermittent action of the ejectors. When flowing into the hopper it lifts the flocculated solid material off the sieve and thus clears the mesh which without this action very quickly clogs. When flowing from the hopper it forces the solid material through the sieve.

Discussion on the Paper

The chairman (Mr. J. Arthur Reavell) called upon Mr. W. J. Gee to open the discussion, who asked a number of questions about the apparatus described by the author, as to whether there were any limits as to the size of particles separable, the percentage of suspension that might be worked with, the question of cost and so on.

Mr. J. McConnell Sanders remarked that the substances considered by the author all possessed the property of absorption, and he suggested that this must play some part. The author's apparatus, which unfortunately they could not see, appeared to him unduly complicated.

Professor Hinchley agreed on this point, and suggested that part of the separation was carried out by jigging, and for information of this mining men should be sought.

The Chairman remarked that though the apparatus appeared complicated it was most interesting and he had himself spent four or five hours examining it when he had only intended to be a few minutes.

Mr. W. S. Lockhart said that to get good separation a solid current without eddies was required. High pressure supply did not favour such conditions.

Mr. B. W. Holman inquired whether it was hoped to develop the apparatus for the commercial treatment of ores.

Mr. Andrews, replying to the discussion, said that the density of material which he could deal with in the apparatus was about one part of solid to twenty parts of water. He could not say anything at the moment with regard to what the cost would be for an apparatus to deal with, say, fifty tons of material per day, but as an engineer he had endeavoured to keep the question of cost constantly in mind. One or two speakers had said that the apparatus was complicated but there was no complication in design as such. There was a moving part and a weight falling backwards and forwards at the top, but the only real complication was the twisting channels of water. With regard to Professor Hinchley's remarks as to jigging, he was rather proud of the fact that the model he was showing was his fifty-eighth model. Mr. Lockhart had spoken about eddies, and he fully recognised that to get really satisfactory elutriation there must be a solid current with no eddies.

Government Financial Statement

THE preliminary Budget statement by the Chancellor of the Exchequer regarding the actual Government revenue of £837,169,284 and expenditure of £788,840,211 during the past financial year, makes interesting reading so far as it shows a balance on the right side, but that the realised surplus exceeds £48,000,000 is poor consolation to the business man who ponders on what an extra 1s. in the £ off the income tax, a year ago, would have meant to trade as a whole. That some £28,000,000 of the surplus is due to reduction in expenditure is a legacy of goodwill from the late Government, which our present rulers may put to excellent purpose if any tangible reduction of taxation should result. The remaining £20,000,000 is accounted for by excesses of revenue over the estimated amount and amongst other "unexpected" receipts, Government finance has benefited by an increase of £6,000,000 in respect of "Death duties." In spite of misgivings, income tax and super tax have brought in, during these twelve months, some £11,000,000 more than anticipated, and unless trade receives some remission from this factor, the surplus may well prove a disadvantage to business recovery should Government spending Departments tend to relax their economies.

The Affairs of Mr. H. H. Hall

THE creditors of Mr. Herbert Harry Hall, of Bent House, Littleborough, lately carrying on business at Sladen Dyeworks, Littleborough, as a dyer and finisher, met at the offices of the Manchester Official Receiver on Thursday, March 27. The debtor's statement of affairs showed liabilities of £7,816 expected to rank and a deficiency of £7,744. He alleged as the causes of his failure lack of capital and bad trade. An order for summary administration had been made by the court and the matter was left in the hands of the Official Receiver.

Reviews

THE SUPERVISION AND MAINTENANCE OF STEAM RAISING PLANT. By Charles A. Suckan. London: Ernest Benn, Ltd. Pp. 342. 36s. net.

It has been said that cheap steam had more influence upon British industrial development than free trade. However that may be, the need for producing steam at the lowest possible cost is in present circumstances more than ever imperative. The post-war cost of fuel has not only forced steam-users to realise the need for practising every possible economy in its use; they have also been forced to admit, with this end in view, the necessity for systematic organisation and continuous supervision and control in the generation and use of steam.

Mr. Suckan's comprehensive treatise on the allied subjects of supervision and maintenance of steam-raising plant is largely the result of specialised personal experience, as combustion engineer and technical chemist, gained in reorganising the working of steam generating and auxiliary plant. This work Mr. Suckan has been doing throughout the country as chief engineer to a well known firm of consulting engineers, and now, in his book, he gives of the wealth of his knowledge and experience to manufacturers and fuel users in general.

One purpose of the book is to explain the principles involved in the selection, examination, and use of fuels for various purposes. Throughout, the author has borne in mind the supreme importance of economy in fuel practice, and especially the education and training of the boiler house executive staff, matters which, in many industries, by no means receive the skilled and sympathetic attention they deserve.

Included in the work are relevant data of value, the result of activities in the same direction undertaken by research institutions, select committees, and a few of the larger and more enterprising firms.

Divided into two parts, the first deals with the actual operation and control of power plant. The second part is devoted to the systematic cleaning, overhauling, and repair of boilers and auxiliary plant in the minutest detail; the subject matter, and the more than usually complete index, being conveniently arranged with a view to facilitate reference and cross reference.

Careful perusal of the book by the present reviewer fails to reveal the omission of any material factor in obtaining and maintaining efficiency in combustion and in the utilisation of heat, but the advantages which accrue by promoting automatic circulation in boilers of the Lancashire type do not appear to have been dealt with.

The illustrations and drawings, which total 250, are of exceptional merit in the manner of their reproduction; and it is not too much to say of this important work that managing directors and others in control of manufacturing plant should see to it that the book is made available to all members of their technical executive staff.

E. W. L. N.

THE MODERN SOAP AND DETERGENT INDUSTRY. Vol. I.—Theory and Practice of Soap Manufacture. By Geoffrey Martin. London: Lockwood and Sons, 1924. Pp. 400. 36s. net.

The present volume is the first of three in which the author proposes to give a complete account of the soap industry from the industrial and technical point of view. In his preface, the author lays stress upon the stimulating effect of recent scientific researches, mainly in the province of physical chemistry, upon the development of the detergent industry and the possibility of substances other than the salts of fatty acids becoming important commercial detergents and even formidable rivals of the derivatives of fatty acids. His object is, therefore, to bring together all the existing data on the chemistry and technology of the subject. His task has been very thoroughly performed, numerous references to technical literature and patents being given.

The present volume is divided into seven sections of about 50 pages, except section 6 upon soap boiling processes, which extends to 95 pages. Section 1 deals with the purely scientific study of detergents and is extremely well done, both as regards matter and documentation.

Sections 2, 3 and 4 give details of the chemical and physical properties of the various raw materials of the industry and their application to the industry.

Sections 5 and 6 deal with soap manufacture and are very liberally supplemented with working drawings and specifications of the plants in use, the chapter on rapid soap drying being particularly interesting.

In section 7, the soaps for laundry and household use are described, and the merits of various ingredients, notably rozin and sodium silicate, discussed.

In the main, the author has confined himself to the compilation of data, and it may be argued that he is a little too ready to accept innovations, though he somewhat disarms criticism by frankly admitting that although many have yet to pass the test of time, they should be cordially welcomed and given a fair trial with that optimism which is a large factor in "making things work."

We should have expected a fuller discussion of the use of hardened fats in the soap industry and the problems which hrise therefrom, and also a reference to the hydrogenated aerivatives of benzene and naphthalene, concerning which much as been written, particularly in the German Press, and for which remarkable claims have been made. Presumably Vol. III will contain a detailed index, and if the second and third volumes are as thorough as the first, the whole will form a very complete volume of reference to the work which has been carried out relating to the soap industry.

T. HEDLEY BARRY.

THE MICRO-ORGANISMS OF THE SOIL. By SIR JOHN RUSSELL, F.R.S., and others. London: Longmans Green and Co. Pp. 188. 7s. 6d.

The workers in agricultural science have been placed under a debt of gratitude to Sir John Russell by the issue of this book, which summarises so clearly the present position of our knowledge of a series of vital biological questions connected with the living organisms in the soil. The various problems and the organisms which give rise to them are dealt with by the experts who are carrying out combined work at Rothamsted, and this method has resulted in a full and clear account of the subject matter.

The opening chapter by Sir John Russell gives an excellent account of the general population of the soil, while its particular sections are discussed in subsequent chapters.

The nitrifying organisms and the nitrogen-fixing Azotobacter are fully dealt with. These have a peculiar interest, and are of great influence upon the nitrogen supply of the soil. The description of the Azotobacter, and also of the nitrogen-fixing bacteria which, by a process that is almost miraculous, carry on these operations within the tissue of leguminous plants, must draw the attention of every chemist. It is remarkable that these minute organisms are able to fix and combine nitrogen to form ammonia and nitrates at ordinary temperatures and pressure, a feat which the chemist can at present only accomplish by the expenditure of great energy, combined with high temperature and pressure. How do the bacteria accomplish this? When that question is answered the farmers will be able to obtain a cheap and unlimited supply of nitrogenous fertilisers.

That the soil should teem with life to the extent which this book demonstrates will surprise many, but that so much should already be known in this comparatively new branch of agricultural science is a tribute to the careful and devoted labours expended upon the subject. This book is worthy the careful study of the chemist, as well as those more directly connected with the problems of the soil.

S. W.

FATS: NATURAL AND SYNTHETIC. By W. W. MYDDLETON, D.Sc., and T. HEDLEY BARRY. London Ernest Benn, Ltd. Pp. 182. 25s.

At first sight a book of 182 pages may be considered dear at twenty-five shillings, but when one's text books are produced in the manner of a presentation edition of the classics one must be prepared to pay for the privilege.

The volume before us covers to a certain extent new ground, and contains a large amount of the original work of the authors in the field of hardened oils—in fact, it may be looked upon as an account of the most recent work on this subject suitably presented, with appropriate introductory matter, for those commencing a study of the subject. There are possibly

some more or less minor conclusions contained therein to which your reviewer would have to take some exception, on grounds of interpretation rather than of fact, but in a subject of this character, which is possibly yet in its infancy, such is not to be wondered at.

The book is divided into twelve chapters, of which the first two are concerned with an introduction to the pure chemistry of the subject. Chapter three deals with the extraction of oil from the seed, and its subsequent purification; six plates of the necessary apparatus are given which will certainly rank among the very finest examples of technical illustration. Chapter four gives an account of the hydrolysis of fats, whilst in chapter five we have a description of the technical methods adopted for the large scale hydrogenation of oils; the Maxted-Thompson process being described in detail. Chapters six and seven contain an account of the physical and chemical properties and composition of the hardened oils, and the changes brought about during the process of hydrogenation, whilst some most interesting remarks are included concerning the separation of complex mixtures of fatty acids. The remaining chapters deal with the commercial uses of the hardened oils and with the possibility of complete synthesis of the oils from non-fatty material. The book will well repay perusal by all interested in oils and fats.

G. D. E.

THE VEGETABLE PROTEINS. By Thomas B. Osborne, Ph.D. Sc.D. London: Longmans Green and Co. Pp. 154. 9s.

It is fifteen years since the first edition of this valuable monograph was published, and the present welcome edition is some 30 pages larger than its predecessor. In the main, the twelve chapters follow, though in somewhat different order, the lines of the first edition. There are, however, some significant additions. Dr. L. J. Henderson contributes at an opportune moment a new chapter, supplanting the old chapter 4, on the relation of proteins towards acids and bases, in regard to which he concludes that "the theory that normal salt formation is the primary phenomenon in all cases where the proteins are found in the presence of acids or bases may be regarded as a well-founded working hypothesis." New chapters on the proteins of green plants and on the nutritive value of the vegetable proteins show in a most interesting manner how research is being conducted in connection with problems of great practical importance, though it must be confessed that our knowledge here is still very limited. An absorbingly interesting account is given of the many practical observations in feeding experiments on animals, both with pure protein preparations and with natural mixtures as afforded by seeds or the parts of seeds used as foods. How much still remains to be done is, however, shown by the following remark of the author (page 108):—"Until more is known about the chemical make-up of the green forage plants, and methods are developed whereby their proteins can be isolated, and further studied, no better basis will exist for correctly choosing the proper combinations of the products available for farm animals than that which we now have founded on empirical experiments with mixtures arbitrarily selected."

The book is a valuable summary of our knowledge of the vegetable proteins by a recognised authority on the subject, and the new chapters contain matter of great suggestive value. A good bibliography of 29 pages, and an index, conclude the work, which can be highly recommended to all research workers in this field. A. R. T.

A FIRST COURSE IN MACHINE CONSTRUCTION AND DRAWING. By T. M. NAYLOR, B.Sc., A.M.I.C.E., A.M.I.M.E., and W. TATTERSALL, Assoc. M.C.T., A.M.I.M.E. London: H. F. and G. Witherby. Pp. 150. Price 6s. net.

This book, as its title indicates, provides a first course in machine drawing suitable for students attending courses in technical schools and colleges. It is illustrated with over 50 examples of machine parts, with drawings of different types of each, and contains useful descriptive information as to their use, for the benefit of students who may not have had an opportunity of seeing them. It should prove an eminently practical little book.

Sulphuric Acid Plants

To the Editor of THE CHEMICAL AGE.

SIR,—In reference to your account of the lecture delivered by Mr. Parrish before the Junior Institution of Engineers, Mr. Parrish would have one believe that the hand-charged kilns are far superior to mechanical burners. This point is certainly debatable. Labour, he says (speaking generally) is practically the same in both cases. Perhaps the author would like to make his case more clear with figures. Mechanical roasters are far beyond hand-charged kilns, even when one considers the extra cost of their running and up-keep.

After some years of experience with mechanical burners and hand-charged kilns, and taking everything into account, one must confess that mechanical roasters, such as the Harris furnace and the Herroshoff furnace, are far superior to any set of hand kilns yet built.

Secondly, there seems to be an exceeding lack of data in regard to Mr. Parrish's "Metro" system—cost of plant, wear and tear of plant, control of plant and nitre consumption. Some light on these last questions will help the heavy chemical industry to answer the questions put by the author in the closing part of his lecture.—Yours, etc.,

March 31, 1924. FERRITE.

The Hele-Shaw Stream-line Filter

To the Editor of THE CHEMICAL AGE.

SIR,—Will you pardon me for trespassing on your space to correct a small inaccuracy in your account of my remarks to the Oil and Colour Chemists' Association on this filter?

Your account states that "the operation of the filter did not seem to depend so much on the viscosity as on the specific gravity of what is being filtered." "Specific gravity" should be "some specific property," as the greater flow through the filter has no regular correlation with specific gravity, in fact, a consideration of the examples given will make this self-evident.

We are at present working very hard carrying out a great deal of research work on the extremely interesting and quite new problems which the filter introduces, and before long we hope that we shall be able to discover what it is that determines the rate at which different liquids pass through the filter. Whatever the result of our investigations may be, however, it is quite certain that specific gravity has little to do with it.—Yours, etc.,

For the STREAM-LINE FILTER CO., LTD.,
J. A. PICKARD.

64, Victoria Street, Westminster, S.W.1,
March 29.

"Discovery"

Policy of a Popular Scientific Journal

IT is announced that Benn Brothers have taken over from Mr. John Murray the popular monthly journal of knowledge, *Discovery*. As its name implies, this paper is capable of covering a very wide field of scientific investigation. The Trustees, Sir J. J. Thomson, Sir F. G. Kenyon, Professor A. C. Seward and Professor R. S. Conway, and the scientific adviser, Dr. A. S. Russell, are maintaining their association with *Discovery*.

In the past *Discovery* has had a special appeal to men interested in abstract science; it is intended, in the future, not only to hold their interest but to devote more attention to applied science, particularly in its human interests in the lives of the ordinary reader who is interested in scientific affairs. The price remains at 1s., or 12s. 6d. per annum, post free.

The April number, the first published by Benn Brothers, is only a foretaste of what *Discovery* will ultimately become. Mr. Cyril Crossland contributes a fascinating article on Coral Islands in the South Pacific, and their blue lagoons, suggested by the recent sailing of the S.Y. *St. George* on a scientific expedition to these parts. Mr. Henry Clay, M.A., has a thoughtful article on "Arbitration in Wages Disputes." "The Present Status of the Evolutionary Hypothesis" is dealt with by Mr. Lancelot T. Hogben, and "Wild Bird Photography" is written about and illustrated by Mr. G. A. Metcalfe. The famous woman traveller, Margaret M. Hardie (Mrs. Hasluck), writes about the Origin and Development of the Turk, illustrating her article with many human photographs. The number also contains copious scientific notes and interesting correspondence.

Central Headquarters for British Chemical Industry

Position Reviewed by Mr. G. S. W. Marlow

Mr. G. S. W. Marlow, assistant secretary of the Institute of Chemistry, in recent addresses to the Edinburgh, Glasgow, and Birmingham Sections, dealt comprehensively with the proposals for a central chemical headquarters. Although, as he remarked, his views must not be taken as officially expressing the attitude of the Institute, Mr. Marlow has obviously gone very thoroughly into the subject, and his addresses, of which a summary is given below, present a good outline of the aims of the movement and the difficulties to be overcome if they are to be attained.

Mr. Marlow said that all chemists seemed agreed as to the desirability of co-ordinating the activities of the many organisations dealing with the various aspects of chemistry. The three main bodies, the Chemical Society, the Institute, and the Society of Chemical Industry, contained between them about 11,000 individuals and the other bodies would contribute about 1,000 more between them.

The main objects of co-operation, were the following :—

(*a*) *Economy in Organisation.*—As an instance, he said they would perhaps realise that the indiscriminate circularisation which was now going on from all the bodies was extraordinarily wasteful in labour, in materials, and in postage. Given co-operation it was a simple matter to send all this forth in an orderly economical manner.

(*b*) *Economy in Publications and in Printing.*—Much had already been done in this respect by the provision of a Bureau of Chemical Abstracts, but much remained to be done in other directions, and he hoped that in time they would see one journal covering every aspect of British chemistry. This would, by reason of its large circulation, prove a still more valuable advertising medium, and reduce thereby the cost of publication. They, as members of the Institute, could give a lead. Their own journal was only issued every two months, and, consequently, much of what it contained was already very much out of date. As an example, they would receive at the end of April their first official intimation of the proceedings at the annual general meeting on March 3, and the report upon the council meeting and the official lecture on March 14, and of the various important section meetings held during March. Summarised, and in certain cases full, reports of these would have appeared in *Chemistry and Industry* and in the trade papers, so that the Institute's journal was not only out of date, but to an extent provided an unnecessary duplication. It cost them £650 last year for printing and postage alone. The Institute had a good opportunity of giving a lead in this matter.

(*c*) *Provision of a Joint Library.*—Much had already been done in this direction, and chemists as a whole should be very grateful to the Chemical Society, who had allowed their Library to form the nucleus of a really national chemical library. He hoped that this scheme would continue to flourish.

(*d*) *Subscriptions.*—All of these suggestions must inevitably lead to one of two things—either an economy to the individual members in their subscriptions or the provision for members of a great deal more for the subscription they paid—or both. It was quite impossible to give any idea as to what savings might be expected until one had an opportunity of looking thoroughly into the whole position of each society, but it was perfectly clear that some economies must be effected. There would be a possibility of a composite subscription, and in this respect he would point out that some individuals might find that they were involved in a higher subscription. According to the latest available figures there were about 1,800 members of the Institute who belonged to no other chemical society. He was not so much concerned at the fact that in the other important societies there were nearly 6,000 members who belonged to no other society, because these societies contained amateurs and many people who did not consider themselves qualified chemists, but every member of the Institute was a qualified professional man, and he thought that it was deplorable that such a large number were content to lose the opportunity of maintaining their professional equipment which was provided by membership of the scientific societies. If a composite subscription were introduced there would clearly be an increase in subscription for such members. As to the financial mechanism, again it was impossible to make any very definite suggestions, but he felt that there would be a possibility of considerable economy in entrance fees, which would induce younger members to join, since the main object of an entrance fee was to enable the societies to build up a capital reserve, and if all the societies were to work together they would have a very considerable joint capital reserve. He thought that a man at present belonging to the three main societies should expect to get all the advantages at about two-thirds of the present cost.

Two Essential Factors

Two factors were essential if they were to secure this co-operation, namely, a central organisation and common headquarters.

With regard to a central organisation, they would be wise to make the fullest use of all existing material. There already existed a Federal Council for Pure and Applied Chemistry, and if this body were given definite powers, and were really representative of all chemists, it constituted the obvious nucleus of the governing body. He conceived a Commonwealth of Chemistry in which the Federal Council, or, or to avoid confusion of metaphors, the newly constituted General Chemical Council, formed therefrom, would be assigned definite functions (with power over certain moneys), and the separate societies would all continue to perform the useful services for which they were created, save only that the General Council would do that work which affected them all. So far as they, as members of the Institute, were concerned, they would realise that the formation of such a widely representative Council would act rather to strengthen than to weaken their professional status. If, for example, the Council contained the Councils of all three of the larger societies, its only objection was that it would be too unwieldy. Ninety-five per cent. of the members would be found to be Fellows of the Institute, and all would be staunch supporters of the Institute's ideals.

With regard to a chemical headquarters, he preferred not to discuss the matter in any detail, but he would ask those present to bear certain fundamental principles in mind. The main object of the plan was to provide a headquarters for all the organisations dealing with the profession and science of chemistry, and, futhermore, to provide adequate meeting halls and library facilities. For the convenience of all, and in deference to the dignity of chemistry, they should have a meeting hall at headquarters, instead of seeking the hospitality of engineers. The library also should be at headquarters, since, apart from the convenience of members, it was most wasteful to set up away from headquarters a separate small clerical department to deal with the library, which was becoming more and more important as a lending library.

So far as he could see the whole problem hinged upon the question of finance. An ambitious scheme had been propounded in 1918, but nothing definite had come of it. They would all agree that chemists were not prepared to put up a sum of £25 a head in donations, and that was the amount which would be involved if their expenditure were of the order of £300,000, as had been suggested. They must, therefore, seek some other way out.

Secondly, they would agree that the experience of the Institute in building its own headquarters only nine years ago had shown that it was very unwise to put up a new building with a reasonably estimated margin for the expansion of their work. In much less than nine years the Institute's building had proved itself quite inadequate for the purposes for which it was built, and they might rest assured that those who planned Chemistry House as a self-contained building would have to be very long-sighted if they were to plan an adequate building. He doubted whether any man could foresee what would be the needs of chemistry in fifty years' time. In the same way he doubted if any man could see what space would be necessary for a chemical library in fifty years' time, the science was growing so rapidly.

Concentration in One Building.

Thirdly, he felt that it was very desirable that all the functions of chemical bodies should be exercised in the one building. At the present moment the chemical bodies were spaced unevenly all over London. In one corner there was the Society of Chemical Industry; two-and-a-half miles away was the Institute of Chemistry; one-and-a-half miles away, again, was the Chemical Society, with its library and meeting rooms; and then about a mile from the Chemical Society and rather more from the Institute was the Club.

This lack of centralisation was a matter which affected not only Londoners, but more particularly country members whose time in London was precious, and who were now called upon to spend a great deal of that time in travelling about London.

Fourthly, their premises must be available to the chemical organisations at as low a rental as possible. They must remember that the Chemical Society was now living rent free, and that the Institute was, in effect, living rent free, since it had its own premises. They would be able to avoid the waste of capital so noticeable when each of the Societies had its separate Council Room and committee rooms, which remained idle except for a very few hours each week. Chemists must try to think of these matters in terms of rental. The Institute's Council Room and Library occupied about 1,700 square feet, and if they had to rent that space they would have to pay well over £1,000 for the rent of these two rooms. It was being used very extravagantly at present.

The final point was that, if, as he had strongly urged, they were to transfer the Chemical Industry Club to their headquarters they would lose the great advantage which was provided at Whitehall Court, where there was a public restaurant, which formed the nucleus of the catering service. Consequently, if they wished to remove the Club they must think of the possibility of having such a restaurant available.

The Question of Funds.

This matter had recently become of considerable moment, since the Society of Chemical Industry had received as a segacy a very useful nucleus to the funds required in the building scheme either for headquarters for the Society or for chemistry as a whole. It was conceivable that many schemes might be put forward for this building; but he hoped that whatever happened they would think not only of the present generation of chemists but also of those to come, and think, therefore, in terms sufficiently large to bring all the functions of chemistry into the one building. They must realise, however, that this would cost money, and he doubted whether that money was available on the purely voluntary basis. Therefore, he put before them the suggestion that Chemistry House should be run as a business proposition; that they should float a separate company in which the main bulk of the shareholders were chemists, in order to secure a building which was very much too large for their immediate needs, and that they should let for profit the space not immediately required. He had conceived a scheme which would require something of the order of £300,000 in capital. He hoped that the chemical societies would invest some of their capital funds in a mortgage on the property.

The space actually required for the chemical bodies, including a library of the size suggested to him by the librarian of the Chemical Society (and he thought that his estimates were quite moderate) would be very nearly 20,000 square feet. Now chemists did not build bridges or perform miracles of surgery. The man in the street did not associate the colours of his bath towel or of his breakfast-room carpet with their profession. But their professional standing in the eyes of the world depended upon the public esteem of their work and they must neglect no adventitious aid to publicity. They should use the importance of their headquarters as a piece of propaganda by assuring that their building had a frontage on to an important thoroughfare in London. This would, however, involve a rental for chemical purposes equivalent to nearly £9,000 per annum. They would see that the accommodation required even now by chemistry was such that a plan conceived on a small or voluntary scale would be likely to fail.

If, as he suggested, they dealt with the matter on a purely business basis, they would have to remember this £9,000 standing rental of the chemical organisations. It represented a subscription of about 15s. per head for every individual in the chemical bodies. He would suggest, therefore, that they should utilise the profits from their letting—(*a*) to produce a reasonable, though perhaps small, return on the capital; (*b*) to allow the chemical organisations to live rent free; and (*c*) to devote the residue either to further interest on the capital or to reserve. They would, however, realise that with (*b*) fixed at £9,000, if the scheme were not conceived on a broad plan (*c*) would vanish and (*a*) would be reduced to negligible quantities. On the scale he had suggested it was possible to make the scheme succeed, but he doubted whether the scale could be reduced.

It had been suggested to him that they should not combine business and sentiment by allowing the chemical societies to live rent free; but they must remember the extent to which they were now rent free, and must realise that whether they would or not, they were considering a matter which represented one of the ideals of chemists. It did not seem to him to matter very much to their pockets whether that £9,000 were used in providing an additional 3 per cent. interest on the capital or in reducing subscriptions to the chemical bodies by the amount of about 15s.

He trusted that the Chemical Industry Club would move to headquarters as one of their first tenants, and he was assured that it was possible to secure a site which would interest some large restaurateur to take a large amount of space for a public restaurant, thereby securing not only the catering department of the Club and a convenience for chemists, but a permanent advertisement of chemistry's headquarters. He hoped that the rest of the space available for letting would be taken up very largely by chemical manufacturers or merchants or by others interested in the advancement of chemistry, so that Chemistry House would be a real chemical headquarters to which the world wide interests in British chemistry would naturally gravitate.

Position of the Institute.

The only point which remained for him to deal with was the position of the Institute in this scheme. It had been stated that the Institute's functions differed so materially from those of the other bodies that it should not enter into a scheme of co-ordination. Further, it had been urged that the Institute possessed its own headquarters, which were stated to be adequate.

On the first point, apart from pure circularisation and editorial work, the Institute's organisation was necessarily more complex and more complete than that of any of the societies, and for this reason was the more easily adaptable to dovetail the similar activities of the other bodies in the general interests of economies for chemists. For this reason, and because the common housing of all the bodies would tend to their rapprochement, he held that the Institute should *not* hold aloof but should throw in its weight. If the Institute held back, and chemists spoke still with two voices, none could say whether the Institute, or all the other bodies speaking as a federation, was correct.

On the second point: at great inconvenience the office accommodation of the Institute had been made sufficient for immediate needs and for slight expansion. It could not be further extended without utilising space intended and specially suitable for other purposes. If the Institute moved its headquarters to Chemistry House, the present building could be utilised as a research building, a purpose for which a quarter of the useful floor space was already used, thus securing a valuable additional asset.

Arsenic Deposits in Chile

In a report from Valparaiso, the American Consul-General states that several large deposits of arsenic are known to exist in Chile, principally in the Provinces of Atacama and Santiago, but apparently no serious attempt has ever been made to work them. Undoubtedly their owners would be found ready to commence operations if they could be convinced that the output could be sold at a fair price. There is a large deposit situated in the Andean foothills close to the capital and to rail transporation and less than 100 miles from tidewater. It is understood that an analysis at the University of Santiago showed an arsenic content of over 90 per cent.

Annual Meeting of the Chemical Society

Professor Donnan Receives the Longstaff Medal

At the annual general meeting of the Chemical Society, held privately at Burlington House, Piccadilly, London, on Thursday, March 27, the Longstaff Medal was presented to Professor F. G. Donnan, F.R.S., for his distinguished services to chemistry. The President of the Society (Professor W. P. Wynne, F.R.S.), in making the presentation, pointed out that Professor Donnan had carried out 25 years of research, covering the wide fields of the nature of colloidal systems in their thermodynamical, electrical and chemical aspects, in the application of thermodynamical principles to chemistry, and in ionic chemistry.

During the discussion that preceded the adoption of the report, Sir William Tilden recalled his election to the society in 1864, long before what might be styled constitutional chemistry held the field. At that time it was generally held that the constitution of a chemical substance could never be expressed as a formula. In his opinion, the startling advances made in chemical research during the past 40 years would certainly not be equalled in a like period of the future, more especially as the electronic doctrine of constitution seemed hardly to lead anywhere. All his life he had felt a great admiration for the Society and its work, and, because he was likely to be able to attend so few more of its meetings, he would take the opportunity of wishing it well.

Russia's Contribution to Chemistry

In his presidential address, Professor Wynne discussed certain aspects of Russia's contribution to chemistry, emphasising the great debt which chemistry owed to Russia, and the sympathy felt for Russian chemists in view of the conditions existing in their country. It was difficult, he said, for them to realise how great was the disaster which had overtaken chemistry in Russia. That some of those whose names were famous before the war were still living—Ipatieff, Faworsky, and Zelinsky among them—was a matter for rejoicing. By them we might be confident that the high tradition of Russian chemistry would be maintained as time and circumstances permitted, but their work of reconstruction, difficult as it must inevitably be, owing to the lack of books, apparatus and materials, was hampered further by the low level to which education had fallen. If the restoration of the standard of educational attainment could not be otherwise than slow—even under the most favourable conditions—no argument was needed to show that research must be hampered for many years to come. That was a calamity, for chemistry was international, and its development must suffer if the contribution which a distinctive school like the Russian might make to the treasury of achievement was withheld or withdrawn.

In this country, and perhaps in other parts of Western Europe, the appreciation of Russia's contribution to chemistry had suffered from two causes at least. During the fifty years preceding the war, the greater part of the work appeared in Russian journals, but in earlier years, being published in German, or less frequently in French, it received less than its due meed of recognition as coming from Russian sources. Therefore, it had occurred to him that some encouragement might be furnished to our sorely tried colleagues if the effort were made to show why chemistry must ever be appreciative of the results of Russian research.

The beginnings of Russian chemistry had been traced to M. V. Lomonosoff, who lived in Moscow in the earlier part of the eighteenth century, built a laboratory there in 1749, and was one of the founders of its University. Working at a time when Stahl's phlogiston hypothesis met with general acceptance, Lomonosoff anticipated Lavoisier by nearly twenty years in his proof that the increase in weight of tin and lead, when calcined under Boyle's conditions in closed vessels containing air, came from the air and from no other source. But in the study of combustion, as in other fields of inquiry, he had the misfortune to be in advance of his times; his work was overlooked or forgotten until the beginning of the present century, and he left no successor. So it came about that chemistry had to make a fresh start in the years which elapsed between the founding of the University at Kazan and the completion of its chemical laboratory in 1835.

Kazan was the intellectual capital of Eastern Russia, and before the war its University was attended by about 1,000 students. Claus, its first Professor of Chemistry, who was best remembered for the discovery of ruthenium in 1846, and for investigations in rhodium, ruthenium and iridium compounds, had been a pupil of Berzelius. Zinin, who entered the University in 1830, at the age of 18, became Professor in 1837, spent the next three years in Germany, chiefly with Liebig at Giessen, returned to Kazan in 1841, and seven years later was transferred to Petrograd, where he remained until his death in 1880. Among Zinin's more striking contributions to organic chemistry were mentioned such fundamental discoveries as the reduction of nitrobenzene to aniline in 1842, of nitro-naphthalene to α-naphthylamine in the same year, and of *m*-dinitrobenzene to *m*-phenylenediamine in 1844, the reducing agent in each case being ammonium sulphide. The identity of Zinin's product, named by him benzidam, with aniline from indigo, was demonstrated by Hofmann in 1843. Although soon replaced by agents more rapid in action, when complete reduction was required, ammonium sulphide was still of service in the step by step conversion of polynitro-compounds into amines. To Zinin was due the isolation of azoxybenzene and its conversion into a mixture of azobenzene and aniline by distillation, and also, what was even more important, the discovery of benzidine, which was achieved by the action of dilute sulphuric acid on the product formed when azobenzene was reduced by hydrogen sulphide. Hofmann later identified this product as hydrazobenzene, and Fittig showed benzidine to be p-diaminodiphenyl. Alexieff, then Professor of Chemistry at Kieff, seemed to have been the first to devise the modern method of reducing nitrobenzene to hydrazobenzene by means of zinc dust and caustic soda.

Four years before Zinin left Kazan, A. Butleroff entered the University as a student, and, on Zinin's resignation, succeeded him. In 1857, Butleroff went to Heidelberg, where he met Kekulé, then to Paris to work in Wurtz's laboratory, returning the following year to Kazan imbued with the new ideas about structural chemistry which characterised Western chemical thought in the middle of last century. Thereafter, the "Russian Butleroff school of chemistry" quickly made its mark. Despite the crowding, inevitable owing to its restricted area, students flocked to the Kazan laboratory. Later, its fame might have been enhanced by the publication of Butleroff's textbook of organic chemistry early in 1864—a book remarkable for its view point even in a remarkable age, and deemed worthy of translation into German at a time when Kolbe's and Kekulé's textbooks might have been expected to suffice for the needs of German students.

After his call to Petrograd in 1868, Butleroff was followed in the Chair at Kazan by W. W. Markownikoff, by A. N. Saytzeff, who occupied the Chair from 1871 to 1909, and afterwards by F. Flawitzky. To Markownikoff, perhaps more than to any of his contemporaries, was due the wide adoption of the principle that Russian work should be published only in the Russian language—an adoption rendered the more easy by the foundation of the Russian Chemical Society in 1868.

Work of the Russian Chemical Society

The work of the Russian Chemical Society was then dealt with. The first meeting took place in 1868, and the yearly volumes of the Society's journal contained valuable contributions to chemical knowledge. Since the revolution, parts of the Journal had been issued, at long intervals, but there was some ground for the hope that the period of greatest depression had passed, as papers of Russian origin were making their appearance with growing frequency in chemical journals. The debt which chemistry owed to the Kazan school might be stated broadly to be the searching scrutiny of the property of unsaturation as manifested, on the one hand, by hydrocarbons isologous with the paraffins, and, on the other by carbonyl derivatives. Herein was found an essential difference between the type of investigation pursued by Zinin and that undertaken by his successors.

Professor Wynne then discussed in some detail the fundamental chemical researches associated with the names of Russian chemists. There were whole sections of Russian chemical work omitted from the address, owing to the limited time available. In conclusion, he said that since the publication of Russian work in Russian became the rule, we in this country had been able to follow what had been done across the language frontier only by the aid of abstracts. Would not those who were young enough to take up a foreign language resolve to learn sufficient Russian to enable them to search that treasure house, the Journal of the Russian Chemical Society?

What was to be our message, he asked, to our colleagues, to whom had fallen the task of reconstruction amid unexampled difficulties? What was the attitude towards science, to chemists and physicists in particular, which the French Government, under the First Consul, was driven to adopt if France was to maintain her position among the nations? Was it not an attitude which stimulated and encouraged research, leading directly to the high estimation in which French science was held from the beginning of last century? Confident that in this respect history would repeat itself, they looked forward, with sympathy and admiration for those who were carrying on the good work in Russia, to the time when their nation would again play a part in the advancement of chemistry no less vigorous and distinguished than was the case before the War.

An informal dinner was held in the evening at the Hotel Cecil. Professor Wynne presided, and there was a large company of guests.

An Evening with the Chemical Society

Some Personal Impressions

It would be difficult to imagine a pleasanter gathering than the "informal dinner" of the Chemical Society at the Cecil last week, and the President's conclusion that it must certainly be repeated expressed what was already in everybody's mind. Whatever the term "informal" was meant to convey, it clearly could not have meant neglect of attire. One noticed no plus-fours, neither laboratory overalls. On the contrary, the ladies—and they formed a good proportion of the company—were most becomingly gowned, while the dress of the men was immaculate, with here and there quite an exceptional taste in waistcoats. Yet somehow the "informal" note was perfectly attained. Everyone relaxed into a social mood, and contentment descended upon all, unconscious and unsought. No one preached to us; no fiery apostle or reformer disturbed our comfortable consciences; no eager evangelist sought to "improve the occasion" by pleading for lost or unlost causes. It was a conspiracy, for one evening at least, to let nothing ruffle our content.

The speaking played no small part in the success of the evening. It showed, positively and by contrast with some recent painful examples, how very good after-dinner speaking can be, when the art is really understood. It began, as these things often do, with the Celtic fringe. Something of the glow and tingle of those far-off bardic ancestors crept into Professor Morgan's words, and listening to his alternate gravity and gaiety one recalled a remark by Gladstone once about a land in which the spoken word always brings the water to a boil. Then came Professor Philip with solid, full-voiced sense, the merest reminiscence of a Highland accent, and a good story. Too gallant to deny that he had sacrificed a noble beard when the Society decided to recognise lady Fellows, he confessed that when the deed was done his students presented condolences on his "beavereavement." What shall we say of Professor Baly? Was it speech or drama, inspiration or merely the genius that takes pains? Whatever it was, it was very good to listen to as, in words that fitted his thoughts like a glove, gesture and voice keeping time with his theme, he drew a picture of the latest Longstaff medallist as one friend sees another. And lastly, Professor Donnan himself, with his deliberate simplicity, short staccato sentences, all words of one syllable—after the thunder and the lightning, this still small voice to finish with. It was all most satisfyingly artistic.

If any of those were present who claim that the guardianship of pure speech has passed from the classical to the scientific school they must have felt confirmed in their faith. And more than that, it was a little impressive to reflect that among these quiet men, sedately drinking their port or tonic water, or beating time to the music they listened to, were those who had extended the boundaries of the world's knowledge, even changed its terms of thought, and whose names and work are known over more than one continent.

In between the speaking there was an interval for a general stroll and a chat, and there was simple but good music. Miss Megan Foster, who gave us some folk songs and other pieces with character in both their music and their selection, sang as if she enjoyed singing to such a cultivated audience, and after her we had some surprisingly good things from among the Fellows themselves. Decidedly the President was right—we must have more of these "informal" dinners. But not too often; only just frequent enough to make life worth living.

H.

Speeches at the Dinner

Mr. H. J. Evans proposed "The Chemical Society," coupled with the name of the President.

The President, replying, said this informal dinner was something in the nature of an experiment. This was the first occasion on which there had been an informal dinner, and from the obvious success that it was, he was sure the Council would endeavour to make it an annual affair.

Professor G. T. Morgan, F.R.S., proposed "The Retiring Secretary," coupling with the toast the name of Professor J. C. Philip, F.R.S. The speech was mainly in a humorous vein, but in referring to the valuable work which Professor Philip had done since he became secretary, Professor Morgan said that the War came within 18 months of Professor Philip's assumption of office, and that fact alone increased the secretarial duties enormously. Without going into all the details of the work that had fallen to the Secretary in that connection, mention was made of the fact that in regard to the defensive side of chemical warfare, Professor Philip was a very active source of inspiration to others. At the same time the membership of the Society increased, and that led to a further increase in the secretarial duties. One outstanding fact was that during Professor Philip's tenure of office the admission of women as Fellows of the Society was decided upon, a matter at one time a subject of acute controversy, but now regarded as something in the ordinary course of things. Another step forward to be associated with Professor Philip was the co-ordination of the Society of Chemical Industry with the Chemical Society in the way of getting some sort of joint action with regard to the publication of chemical abstracts. That had led to the formation of the Bureau of Chemical Abstracts, a composite body representing the Chemical Society and the Society of Chemical Industry, of which Dr. Philip was the first chairman. Although this body had not functioned for any length of time, it had already effected one or two reforms, one of which was in the spelling of the word "Radicle." For upwards of 30 years the Publication Committee of the Chemical Society had insisted upon a dubious spelling of that word (laughter). The last time this matter was brought up it met with some degree of opposition from their immediate past treasurer, because, he said, the word "Radical" reminded him of a political party which he held in abhorrence (laughter). There should, therefore, be no dispute as to the way in which the word "radicle" should be spelt.

After an amusing reference to the attributes of the ideal secretary, Professor Morgan said that Professor Philip had all the qualities which an ideal secretary should have, as well as other excellent personal qualities, all of which made it a matter of regret that he was resigning the position of secretary. At the same time, they were all extremely grateful for the work he had done for the Society as senior executive officer, and hoped that they would continue to have the benefit of his mature advice in his capacity as vice-president and as chairman of the Bureau of Chemical Abstracts and in many other similar capacities.

Professor Philip, who was received with great enthusiasm, in replying, said it would be idle to deny that the machinery of the Society was now a little more up-to-date than it was, say, 10 years ago, and he consoled himself with the reflection that the time and energy which had been put into that work had not been wasted. There had been many critics during that period—friendly critics—who had come forward with

suggestions as to desirable innovations, and he had always taken the view that any suggestion put forward, if it were definitely helpful and constructive, should be welcomed and at least given fair consideration. It was fortunate that there had been very little grousing and non-constructive criticism in the Chemical Society. It was fortunate that the Society —the senior chemical organisation in this country—should have taken a foremost part in endeavouring to bring about the co-ordination and co-operation of the different chemical bodies. It had also had a share in bringing the Association of British Chemical Manufacturers into existence; there was the joint library scheme, whilst last year the step had been taken of the separation of the Transactions from the Abstracts. This had rendered it possible to have one definitely independent British organisation for the production of abstracts, and this might possibly ultimately lead to one abstracts publication in the English language. This was work accomplished of which the Society might feel proud. Finally, Professor Philip congratulated the Council on arranging this informal dinner, because it enabled them to escape the sort of exhibition there had been at one or two recent dinners when very distinguished persons had displayed a colossal ignorance of what the chemist really was (laughter).

The Longstaff Medallist

The final toast was "The Longstaff Medallist for 1924," coupled with the name of Professor F. G. Donnan, F.R.S.

In proposing this, Professor E. C. Baly, F.R.S., said he could not improve on the words which the President had used at the annual meeting in the afternoon in referring to Professor Donnan's scientific work. In Donnan they had a personality which had both dominated a very far-reaching school of research and had also endeared him to all as a friend and brother. His own feelings were incapable of exact expression because in trying to voice appreciation of Professor Donnan he found himself overwhelmed by the recognition of his own indebtedness to him, and although at times they tended to hide their deeper feelings, he felt that this was an occasion when he was proud to speak of Donnan as a stimulating personality, as a great philosopher, of his never failing wealth of helpful criticism and advice, of his wonderful encouragement when the days seemed dark; and of his enthusiasm for Dame Nature and her handiwork. "I owe him a debt that never can be repaid," added Professor Baly. The Longstaff medal was a triennial epoch in the annals of the Society, but on this occasion he felt that the Council, in honouring Professor Donnan, had honoured itself by inscribing a very distinguished name on an already distinguished roll.

Professor Donnan, who was enthusiastically received when he rose to reply, said he failed to recognise the picture which Professor Baly had painted, but he again thanked the Council very heartily for awarding him the Longstaff medal and the company for the manner in which the toast had been received.

Publication of Commercial Research

THE Eastman Kodak Co., of Rochester, U.S.A., have recently issued a volume, the sixth, of abridged scientific publications from their research laboratory. The volume contains, in 240 pages, summaries of some 35 papers dealing with physical and chemical problems arising from the preparation and manipulation of photographic material. Some of the subjects dealt with are the use of artificial illuminants, the silver nucleus theory of development, the theory of exposure, the application of the quantum theory, graininess of photographic materials, etc. The papers are excellently set out and compel admiration for the immense amount of valuable research which is being conducted on behalf of the firm.

Rules for Sugar and Cocoa Pulverising

THE American National Fire Protection Association at its May meeting will be asked to give final approval to proposed regulations regarding prevention of dust explosions in the pulverising of sugar and cocoa. These rules are almost exactly in the form adopted tentatively by the N.F.P.A. a year ago.

Chemical Industry Exhibits at Wembley

WE understand that, though the work on the chemical section at the British Empire Exhibition has been affected by the labour trouble, there are good prospects that the prearranged date of opening, April 23, will be adhered to.

Enzymes in Skin Treatment

Society of Chemical Industry: Nottingham Section

Two papers were read at the meeting of the Nottingham Section of the Society of Chemical Industry held on Wednesday, March 26. The first, dealing with the treatment of skins, entitled "Some Scientific Aspects of Puering and Bating," by Mr. C. E. Pickard, was read by Mr. D. J. Law, B.Sc., F.I.C. This paper dealt chiefly with the co-ordination of scientific data on the problems of puering and bating. The changes which occur during treatment were described, both of enzyme (artificial) bates, and the older method involving the use of fermenting infusions of manure. The processes of puering and bating are identical theoretically and consist in removing "scud" which includes hair roots, sweat glands and pigments. Practically, the term "puering" is applied to the lighter variety of skins such as sheep, goat, etc., whereas "bating" was given to the process in connection with the heavier skins. The principal enzyme used is of a proteolytic nature resembling trypsin, and during bating only some of the elastin is removed, part of it being digested by the enzyme. R. H. Marriott's conclusion that complete removal of elastin was not essential was supported by the investigations of J. Turney Wood.

A discussion followed the paper, in which Mr. Burford asked if a number of enzymes were involved during bating, and if they had any action on collagen.

Mr. Powell inquired if pepsin could be used in the puering or bating processes.

Mr. Pentecost wished to know if the action of acetic acid upon the skin would produce shrinking or unevenness.

Mr. Law, in reply, stated that at least five enzymes had been isolated in the puer liquor. Trypsin did not act upon collagen under ordinary conditions, but after excess liming, the collagen became partially hydrolysed, and was then changed similar to the manner of gelatin. As pepsin only worked in an acid medium, it could not be utilised in puering as this operation was carried out in an alkaline bath. Excess of acetic acid on the skin would produce considerable swelling, but actually only sufficient acid was used to neutralise the lime.

Estimation of Morphine

The second paper, "The posthumous papers of Mr. J. M. Wilkie, B.Sc., F.I.C., in collaboration with his colleagues," was read by Mr. Powell.

The estimation of morphine by making use of a plugged separatory funnel was first described as being a more desirable method than the British Pharmacopœia method, which involved the use of tarred filter papers. The absorbent cotton plug retains the morphine (crystalline), which is titrated with standard acid instead of being weighed.

Another method, based on that recommended by Anneler, consists in extracting the morphine by a mixture of isobutyl alcohol and chloroform in equal parts. The extract is shaken with standard sulphuric acid and titrated back with standard caustic soda.

Good results were obtained with both simple and complex morphine preparations, and this method involves but little loss of the expensive isobutyl alcohol as this can be recovered after washing and used again.

The third morphine estimation was a colorimetric method—a modification of Denigé's reaction, involving the production of a pink or red colour of morphine in the presence of copper sulphate, hydrogen peroxide and ammonia. Solutions of morphine as dilute as 30 m.g. per litre gave a distinct colouration.

The ignition of difficultly combustible substances was greatly facilitated by the addition of finely powdered silica or tribasic calcium phosphate, which were either inert to many substances or else acted as non-volatile acid or non-volatile base respectively.

The last paper dealt with the use of camphor as a filtering medium whereby bismuth determinations could be performed as the camphor was completely volatilised on the steam bath.

Following these communications, Mr. Burford said he had always wondered why the Pharmacopœia had retained the use of the double filter. He felt that in carrying out a colorimetric determination on such small amounts of morphine, a blank test should be performed. The addition of silica to assist ignition and the use of camphor as a filtering medium appealed to him as very excellent ideas.

Coloured Pigments for Paints

Lecture by Mr. Oliver Wilkins

UNDER the auspices of the Paint and Varnish Technological Classes of the Chemistry Department of the Birmingham Municipal Technical School an open lecture on "The Manufacture and Properties of Coloured Pigments for Paints, etc," was delivered on Friday night, March 28, by Mr. Oliver Wilkins, chairman of Oliver Wilkins and Co., Ltd., of Derby. There was a representative attendance of those connected with the Birmingham and Midlands paint, colour and varnish trades.

Dealing with the properties of colours in modern use the lecturer chose three divisions: (1) natural products, or earth colours; (2) inorganic chemical colours that were largely the production of mineral colours by the scientist; and (3) lake colours, this class being the manufacture and precipitation of aniline dyes on to suitable bases.

Mineral Colours

The principal mineral colour used was red oxide, this being an oxide of iron mixed with varying quantities of silica and alumina, the quality and price varying according to shade and iron contents. Purple oxides, or what were sometimes termed purple browns, were obtained as a kind of by-product from the chemical works. The yellow ochres, or yellow oxides, varied considerably in composition, shade and value according to the country or districts of their origin. The composition of an average yellow ochre was principally iron hydrate and carbonate with varying proportions of silica and alumina. Next in order of popularity probably come umbers and siennas; the colouring matter in the former was due to the large proportions of manganese compounds coupled with alumina. The quality of the siennas depended more largely upon their transparency than their body or covering power and the cleanliness of their neat tone and reduction. The composition of siennas was a kind of cross between the ochre and the umber, being largely ferric hydrate or carbonate with proportions of manganese hydrate.

Carbon Blacks

The author then spoke of the Drop Black, which is so largely used in the paint, coach painting and enamel industry; it was an animal black produced from bone charcoal. It was really second-hand spent decolorising charcoal. Carbon blacks were nearly all produced in America by the burning of the natural gas. There was an enormous waste in the production of carbon black, and the fears of the restrictions as to manufacture led to the enhanced prices of about six or nine months ago. In round figures 1,000 cubic feet of gas contained theoretically 33 to 34 lb. of carbon black, and yet the average yield on a commercial basis was only three-fifths to four-fifths of a pound, or about 2½ per cent. of the theoretical contents.

Chemical Colours

Referring to the second series of colours—the chemical colours—Mr. Wilkins pointed out that these were the production through chemical means of the pure pigments imitating the natural products of the earth in shade, but minus the impurities they usually contained.

Referring to ultramarine blues, though these were made artificially by the combination of sulphur, silica, alumina and soda, it was a remarkable fact that chemists had not yet been able to ascertain the exact cause of the blue colouration, and whilst it was produced in most beautiful shades and the processes for its production were well known, the analysis of the finished compound did not yield the secrets of its beauty. Emerald green was a colour that used to be used in fairly large quantities, although fortunately it was being replaced by anilines for painting purposes, and its interest centred largely on its use as a weed-killer.

Lead and zinc chromes were produced by the action of acids upon the relative metals lead or zinc and the subsequent precipitation out of the lead or zinc solution of lead or zinc chromate by an addition of the potassium or sodium salts from the metal chromium. The manufacture of these colours had been subject to a great deal of investigation during the past few years, and numerous processes had been evolved producing colours similar to those obtained in the orthodox manner. There was a wide variety of different chromes, prepared in different ways; lead chromes were the most used commercial yellow products because of their beauty of tone and strength, and were supposed to be permanent to light. They had the disadvantage, however, of being affected when subject to sulphurous gases, tending to form the black sulphide of lead. Zinc chromes were paler and greener in shade than the average lead chromes, more crystalline in structure and therefore not quite of the body or covering power but were more permanent to bad atmosphere.

Referring to Prussian blue, Mr. Wilkins said this was a colour largely used in nearly all colour-using industries on account of its beautiful tone in reduction and staining power. It was first produced by a German in 1704, and was known also as bronze blue, Chinese blue, Berlin blue, Paris blue, etc. Prussian blues were made by the action of an iron salt on an iron cyanide salt, after which oxidation produced a ferric ferrocyanide. Physical construction of the crystals was very marked in the production of this colour, for great variations could be obtained in the tone of the blue produced, whilst a chemical analysis of the final product was practically the same.

Lake Colours

As to the last series of colours under review, namely, lake colours, or pigments from organic dyestuffs, this section might usefully be subdivided into two or three divisions, considering firstly which of the many thousands of dyes on the market were suitable for the paint and allied industries. A colour was required that was fairly fast to light and could be made insoluble in water, also spirits and oils, of the correct shade, both neat and in reduction, and sufficiently strong to make its price a commercial possibility. Special tests were needed according to the industry in which it was to be used. For the linoleum industry it must stand the high temperatures that were generated in their process, for wallpapers it must stand heat and certain soluble sizes, for rubber it must stand the sulphide salts, for celluloid it must stand acetone, for distempers it must be unaffected by caustic sodas or lime, and numerous others. They had then to consider for what purpose it was to be used and prepare the base accordingly. The cheapest base, of course, for paint purposes was barytes, or Paris white, and as this took so little staining only a small quantity of dye is necessary to make bright-looking colours, but the finished product would necessarily have little body and not do for high-class work. Hence chemical bases were produced that have good body and produce soft and silky pigments of a light gravity that would not settle when ground in the medium. Of chemical bases there was a good range, the most common being the chemically made barytes or barium sulphate, or what was known in the trade as blanc fixe. This was a beautifully soft base (when made properly), but by itself for some purposes and with certain dyes it did not work well. It was therefore relieved by the addition of varying proportions of aluminium hydrate, and the major portion of high-class lakes were produced by the combination of these two products.

Having selected the base most suitable for requirements, dissolved the dyesuff and added this to the base, staining the white base, say, red, and they must fasten this dyestuff on to the base so that it became insoluble in water, and for this purpose salts of various metals were used, such as barium or calcium chloride, lead acetate, etc. These various chemicals affected the shade of the dye, forming a metallic salt with the dye according to which one was used, but after its addition the water surrounding the colour should come perfectly clear. It was then only necessary to wash the product thoroughly to free it from soluble salts, press it dry and powder, and pack for dispatch. Most of the lake colours used in the paint and allied industries were of the azo series, and derived from naphthalene. Mr. Wilkins then described the preparation of a typical red dyestuff.

In conclusion, he added that though colour makers had their difficulties they realised that the user had his, and whilst confessing the fact that many manufacturers used to find it very difficult to appreciate the various whims and fancies of the different colour users when complaints were made that seemed so microscopic, the older one got, the more wisdom and experience taught one that often these microscopic differences were of vital importance, and the success of their joint industries was only assured when perfect confidence and co-operation between the manufacturer and the user was obtained.

"Chemistry in the XX Century"

Introduction by Dr. E. F. Armstrong

'If the world could afford to subsidise research on the same scale during the decade under peace conditions as it did during the War our rate of progress would be beyond all belief, though it must be confessed that great social disturbances might follow, as probably the world would be unprepared to receive the new wonders," says Dr. E. Frankland Armstrong, F.R.S., President of the Society of Chemical Industry, in the course of his introduction to the new book on *Chemistry in the XX Century*, which will be published shortly by Ernest Benn, Ltd.

Scientific inquiry, he says, is coming to be recognised more and more as the basis upon which advance in industry rests. Chemistry, in particular organic chemistry, is perhaps to-day at the parting of the ways, and we may well be on the eve of another great advance, due to the birth of new views of structure. The development of organic chemistry is nothing short of marvellous. In 1885 it was possible to write that the physiologist complained that probably 95 per cent. of the solid matters of living structure were pure unknowns, and that the fundamental chemical changes which occur during life were entirely enshrouded in mystery. To-day, fats, sugars, proteins, tannins, alkaloids, terpenes, colouring matters, purins have all been conquered by the chemist, and even starch and cellulose have begun to yield up their secrets; the nature of only a few per cent. of the components of organic structure remains unsettled, and we are far forward in our understanding of vital problems.

It is next to impossible for the layman to form any proper appreciation of how far the results of chemical science are of influence in daily life, still more to what an extent they are likely to come to his assistance in the future. He is more or less aware of the way in which the purity and quality of his food is watched over, both by the professional analyst and by the chemist at the food factory. To feed the teeming multitudes of our great cities, on ships and in the barren places of the earth, to say nothing of the modern army, would be impossible without the discoveries made by the chemist regarding sterilisation and the preservation of food in non-poisonous, cheap metal containers.

The productivity of the soil and the quality of the crop have been greatly enhanced by the activities of the chemist, so that the daily loaf, from the time of selecting and sowing the seed, manuring the land, harvesting the seed, and its passage through the rolls and bolting sieves of the miller to the doughing tub and oven of the baker, never escapes the vigil of the chemist; some day he may even succeed in having it delivered to the consumer wrapped in clean paper.

Refrigeration is to-day in itself an applied science with the dignity of a special international congress, which will be in session during the period of the Empire Exhibition. It is based very largely on the researches of a long line of distinguished chemists made with the object of producing the low temperatures required to liquefy, one after the other, the so-called permanent gases.

The story of the liquefaction of hydrogen, and later of helium, is one of the epics of chemical history—as is still more the whole chapter of the discovery of the rare gases. Just think of the facts—scarce thirty years ago no scientific worker had even dreamt of the existence of the inert gases, and yet they were all around us. In quick succession five new elements were discovered, one of them, helium, which has proved to be the most wonderful of all. To-day we, or at least our American cousins, fill an airship with this gas—Ramsay's discovery—without causing undue excitement in the world at large. Argon is so common that it is used in filling the ordinary "gas-filled" electric lamp, neon replaces it in some illuminated signs. Never before have the results of abstract science so soon become of value in industry.

Few indeed will associate the now indispensable vacuum flask with low temperature research; this was Dewar's greatest gift to the nation, and his name should always be associated with it. How few would at first thought connect the airship, the electric lamp, the picnic flask and the Sunday joint with Faraday's attempts to liquefy gases. How pregnant for the future may be the researches that are being made.

It was found by Hopkins in the domain of biochemistry that whereas animals could be kept in a healthy state and even grew on natural food, as, for example, milk, they invariably languished or died when fed with an artificial mixture of fats, proteins, carbohydrates, and minerals of the same composition as milk. Even this diet could be rendered complete by the addition of a very small amount of fresh milk. It has been proved beyond question that in many foods accessory factors exist and that their presence is absolutely necessary in any diet on which an animal can develop normally. These substances are termed vitamins. Fuller investigation has shown that there are at least four of these vitamins. So far there is not the slightest clue to their chemical structure, or indeed to the nature of their action, and recent observations of McLaurison in India, would lead us to pause before being too absolute as to their activity and importance. The proposition is perhaps far more complex than has been supposed. However, a new conception has been introduced into the study of food materials, that of stimulation; a similar explanation has latterly been given in connection with the function of certain of the ductless glands, which secrete well-defined substances capable of acting as chemical messengers. We are learning that the control of the body functions is in part chemical and in part effected through the nervous system.

Protecting Wood Against Moisture and Corrosion

When wood is exposed to the atmosphere the greatest changes brought about in its constitution, apart from decay by various insects, are those in the moisture content of the wood structure. These changes in moisture content lead to shrinking, swelling, and the setting up of a number of internal stresses. Naturally when wood is well seasoned these changes have already taken place and little difficulty is to be expected when such wood is utilised. On the other hand, if wood is exposed to a variety of atmospheric conditions, as it is in England, some kind of protective coating must be used which prevents, or at any rate retards, these changes.

Linseed oil is very often recommended for such a purpose, but though it is useful in conjunction with other substances alone it is ineffective for moisture-proofing. A good oil paint affords a very durable coating when applied to exposed wood, but it has been shown that a film of oil paint will not prevent moisture fluctuations. An oil paint with a heavy pigment is slightly more effective; in this class may also be placed spar varnish and graphite paints.

Better results are obtained by using a cellulose lacquer, especially if solids are incorporated. These lacquers dry quickly and form an elastic film. Rubbing varnishes are better still, due, no doubt, to the gum content.

A mixture of gloss oil and aluminium powder dries rapidly, and, as a moisture resistant, is superior to those enumerated above.

Some pitch and asphalt paints are highly efficient and have the advantage that they are comparatively cheap. Another effective coating is aluminium lead with an asphalt paint base.

The Most Resistant Coating.

In order to ascertain the most effective moisture resistant coating, a series of wood panels were treated with a variety of these preparations, and exposed to a humidity varying from 90 to 100 per cent. for a fortnight. The efficiency of the coatings are given on a percentage basis. The results were: Linseed oil, 40; white lead oil, 50; spar varnish, 60; graphite paint, 61; cellulose lacquer, 73; shellac, 87; enamel, 88; rubbing varnish, 89; paraffin, 91; aluminium bronze, 92; aluminium lead, 95; asphalt paint, 96; aluminium lead with asphalt paint base, 98.

During seasoning wood dries much more quickly from the end than from the side grain and, for this reason, moisture-resisting coatings are often applied to the ends during air seasoning or kiln drying. The coatings for this purpose are of two kinds: the first is liquid at ordinary temperatures and may be applied cold; the second is solid at ordinary temperatures and must be applied hot.

Either of these coatings is suitable up to a temperature of 140° F., the hot is better from 140 to 170° F., but no coating is entirely satisfactory above this temperature.

If a cold coating is used it should be about as viscous as ordinary golden syrup. The most effective cold coating has been found to be hardened gloss oil with air-slaked lime; this coat is also cheap. The next most suitable are china-wood oil and barytes, also cheap; linseed oil and white lead, moderately cheap; spar varnish and barytes, expensive.

Of the hot coatings the best are coal tar pitch and a mixture of rosin and lamp black. Asphalts are effective but not easy to apply, and paraffin may be used for air-drying but not on wood which is to be placed in a kiln. If the wood is hot dipped, care must be taken to see that the end is entirely covered.

For protecting wood against corrosion, for instance, in the case of wooden tanks to hold liquids, coal tar pitches, asphalts, gums and waxes are sometimes used, either in the solid or the liquid form. If the liquid is used it is applied with a brush as an acidproof paint. If the solid form is employed it is usual first to apply a prime coating, either of the same or similar substance, then to melt the solid and put it on over the prime coat.

When these solid protective agents have a low melting point it is often the practice to mix in some substance which will prevent the coat from running down the side of the tank. As an alternative some such material as duck may be fixed to the sides of the vessel between the coats of paint.

My own experience is that the solid paint is better, and I have found that a thick coating of one of these melted solids will reduce penetration to the minimum. In a large number of cases I have found that the liquid corrosive-resisting paints were not so effective; indications of absorption were found, together with the consequent contraction or expansion, though the effects of this action were very long delayed.

It seems to me that when a wooden tank is constructed the designer should know exactly the solution and the strength of that solution which the tank is to hold. These data will enable him to select his wood and the material for reinforcement, such as Monel metal, lead-covered acid-resisting bronze, brass or iron rods or hoops. He will also be able to ascertain whether he should use a lining or a protective coating.

HARTLAND SEYMORE.

The Evolution of Aniline Dyes

Sir Jesse Boot Lecture at Nottingham

THE Lecture Theatre of the Nottingham University College was crowded on Thursday evening, March 28, when a Sir Jesse Boot Foundation Lecture on "Evolution in the Chemical Industry—Aniline Dyes," was given by Mr. H. Lambourne, B.A., B.Sc., F.I.C., in the absence, through indisposition, of Dr. Kipping.

The question was often asked, he said, why we had ever lost the coal tar industry. A lot of books, pamphlets and people said Germany stole our dye industry. One of the main contributory factors in our loss was the lack of scientific control in our industries. The German methods prospered because there was close co-operation between their Universities and colleges and their industrial laboratories. The German chemist, too, was willing to plod along without any immediate recompense, but, unfortunately, the English chemist too often expected his reward immediately, and in hard cash.

These two were pertinent factors which loomed very large in comparison between English and German chemistry, and he (the lecturer) knew of no German industry which was not controlled by scientific men.

Prior to 1856, all dyes and colouring matter were obtained from natural sources, and classic examples of such colours which had been in use for thousands of years were Tyrian purple, madder and indigo. The Tyrian purple of the ancients was of animal origin, and was extracted from a certain species of snail found on the shores of the Mediterranean, while indigo was of vegetable origin, being obtained from the indigo plant, which grew in India and other tropical countries.

Mr. Lambourne referred to the process of the preliminary distillation of coal, coal tar and the products of coal tar, and said that Sir William Henry Perkins' discovery of mauve in 1856 was the first coal tar colour ever made. This gave a tremendous fillip to the industry of dye manufacture, which, however, was for many years confined to England and France.

The process of producing magenta or roseaniline dyes, and the artificial madder, sometimes known as alizarin, were dealt with. Between 1885 and 1901 more azo dyes were prepared than all others put together. Aniline was not obtained direct from coal tar, but from benzine, while indigo was a product of naphthalene. Considerable research work was done by C. B. Mansfield, an English chemist, who, in 1856, was burned to death while experimenting.

The lecture was made exceedingly interesting by experiments and lantern slides, and a large number of British dyed fabrics occupied a prominent position on the platform.

Chemistry and the Kinema

Demonstration of the F.B.I. Films

Two of the series of industrial films which have been prepared by the Federation of British Industries, for the purpose of enabling the public to appreciate the value of our industries to the nation, were shown on Monday, March 31, at a joint meeting of the London Section of the Society of Chemical Industry and the London and South-Eastern Counties section of the Institute of Chemistry, held in the lecture theatre of the Institution of Mechanical Engineers. These two films dealt with branches of the chemical industry, and were entitled "Heavy Chemicals" and "Coal and its Products."

The films were shown by permission of Mr. W. J. U. Woolcock, C.B.E. (General Manager of the Association of British Chemical Manufacturers), who, in the course of a few preliminary remarks, pointed to the necessity for the public to know something about the industry, and said that what we wanted to do was to encourage the public to think that the chemical industry as a whole was something for them to be interested in, and to take a pride in; also, we wanted to instil into the minds of everybody that they should insist upon having what was provided by Great Britain. The aim was to impress upon the whole world that anybody connected with the British chemical industry was connected with an industry which was bound to succeed, and which supplied finer goods and material than any comparable industry in any other part of the globe. Hence we had a mass action going on in propaganda nowadays which is quite different from anything we have had before.

The first film depicted in a very interesting manner the manufacture of such common heavy chemicals as sulphuric acid and washing soda, as well as the despatch of the finished products to the market; the second dealt with the gasification of coal, the manner in which the gas deposited its tar, ammonia, etc., and the products obtained from the tar and ammonia, as well as some of the numerous purposes for which they were used.

The kinema has also been used by Mr. E. V. Evans (Chief Chemist of the South Metropolitan Gas Co.) for illustrating certain organic reactions to an audience composed of technologists engaged in the gas industry. By permission of Mr. Evans, a film was shown which illustrated the reactions taking place when compounds of the cyclohexane type are subjected to heat treatment. In this case chain diagrams were used, and an arrow carried out the duties of master of ceremonies, moving from point to point in order to show how the molecules were distributed in the course of the reaction desired.

Society of Chemical Industry in Glasgow

AT A MEETING of the Glasgow Section of the Society of Chemical Industry in the Engineers' and Shipbuilders' Institute last week, Mr. W. E. Moodie, Chairman of the Section, presided, and Professor T. S. Patterson gave a short talk on some pieces of laboratory apparatus. Dr. J. A. Cranston then delivered a lecture on "The Influence of Chemistry on the Recent Knowledge Gained of Atomic Structure." It was shown that the genetic relationship of the elements is indicated by the periodic law and by the fact that the electron was a constituent of all types of matter, and thus electrical content governed chemical properties. The function of electrons in chemical change was then dealt with, it being shown that when sodium combined with chlorine to form sodium chloride the sodium atoms lost each an electron, and the chlorine atoms gained each one electron, the chemical union resulting from this transfer of electrons. Another kind of union, however, by which two similar atoms could combine was one in which electrons were the actual cementing material between the atoms, and such union produces compounds quite different in properties from the former kind of compounds.

Chemical Matters in Parliament

Imperial Institute

REPLYING to a question by Mr. Palmer (House of Commons, March 27) Mr. Thomas said: There is no intention of closing the Imperial Institute. I presume my hon. friend refers to the resolution passed at the Imperial Economic Conference that the galleries of the Institute should be closed. The position has, however, materially changed since then and representations from certain of the Dominion Governments have been received desiring that the galleries should remain open. I hope to be in a position to make an announcement about the whole matter before long.

Experimental Production of Lactose

Mr. Baker (House of Commons, March 31) asked the Minister of Agriculture the reasons which actuated his Department in deciding to stop the experiments in the production of lactose, and whether, having regard to the importance of the problem and to the reported success of Governments elsewhere, he would reconsider the decision.

Mr. Buxton: This question is being again considered, and I hope it may be possible to continue experiments at the Ministry's lactose factory.

Perfumed Spirits Duty

Mr. Lorimer (House of Commons, April 1), asked the Chancellor of the Exchequer if he would allow British perfume manufacturers to use duty-free spirit in their process of manufacture, and whether he was aware that unemployment in the perfumery industry was being caused by French competition in the home and foreign markets, due to the fact that the French article could be sold at a lower price because they were permitted to use duty-free spirit.

Mr. Snowden: As regards the first question, I am unable to adopt the hon. Member's suggestion. As regards the second, I am unable to anticipate the Budget statement, but I would point out that perfumed spirits imported in bottle from France are subject to a duty of £6 3s. 5d. per liquid gallon.

Dyestuff Import Licences

Mr. W. Greenwood (House of Commons, April 1), asked the President of the Board of Trade if he was aware that John Young (of Radcliffe), Ltd., Red Bank Dye Works, applied for a licence on March 5, 1924, for 120 lb. of Geigy's safranine superfine double B; that they were referred to British Dyestuffs Corporation, Ltd., Messrs. L. B. Holiday and Co., Ltd., and the North British Chemical Co. for identical products; that they obtained L. B. Holiday and Co.'s safranine and dyed up bulk shade, and it appeared to be all right; that the goods were sent to the customer woven and finished; that the customer complained that they did not stain off correct shade; that the firm reported to the Dyestuffs Licensing Advisory Committee, who informed them that they must try the British Dyestuffs Corporation and the North British Chemical Co. and fail with their products before a licence could be obtained; that, although an interview was sought with the director, it could only be obtained on March 26, 1924; and whether, in view of such a waste of time when orders were so badly needed, he would consider doing away with the licensing system and replacing with a definite import duty, so that customers could purchase their requirements at once under known conditions?

Mr. Webb: The application to which the hon. Member refers was made on March 5, and the applicants were immediately referred to three British makers. On March 18 they stated that they had tried the product of one British maker and found it unsuitable for a particular purpose, though quite satisfactory for ordinary dyeing purposes. In reply to an inquiry on March 20, as to trying the products of other makers, the applicants sought an interview on March 26, and on further information being given, a licence was immediately issued. The answer to the last part of the question is in the negative.

Formaldehyde as Meat Preservative

Questions on the use of formaldehyde as a preservative for meat were raised in the House of Commons on April 1. In answer to Viscount Curzon, who asked Mr. Wheatley whether he was aware that formaldehyde was thought by the medical profession to be a very dangerous preservative, Mr. Wheatley said that he would require to be guided by his competent advisers on that point.

Voluntary Liquidation of Chemical Company

IN pursuance of the provisions of the Companies (Consolidation) Act, a meeting of the creditors of Marvella Products Ltd., Sonsiel Works, Cadoxton, Glamorgan, manufacturing chemists, was held recently at Cardiff. It was stated that the shareholders had previously passed a resolution to the effect that the company could not, by reason of its liabilities, continue its business, and that it was advisable to wind up voluntarily. The statement of affairs was dated March 27, and it disclosed liabilities of £5,657 10s. 5d. The assets were estimated to realise £3,500, from which had to be deducted £27 10s. 7d. for preferential claims, leaving net assets of £3,472 9s. 5d., or a deficiency of £2,185 1s. The statement set out that the bank were secured by a mortgage of £4,000 on the whole of the assets. The company was registered on March 31, 1920, with a nominal capital of £5,000. Debentures were registered in June, 1921, for £2,500, whilst subsequently a mortgage was registered in favour of the bank to secure all moneys due or to become due. The meeting passed a resolution in favour of the voluntary liquidation of the company, with the liquidator appointed by the shareholders.

Chemical Industry Must be Progressive

IN the annual report of the Society of Chemical Industry (Nottingham Section) presented at the Nottingham University College on Wednesday, March 26, reference was made to some important aspects of chemistry in its application to the discovery of accessory food factors and the consequent control of the deficiency diseases and also to the supply of essential fertilisers in agriculture.

"In contrast to the importance of such contributions is the almost complete indifference of the general public and the apathy of those in authority," comments the report.

Chemical industries, the report continues, must always be progressive in their nature, and all industries have become with the advance of science more or less chemical industries. The only real hope of maintaining these industries in the face of an ever-increasing international competition is for the technical man, more especially the chemist, whose duties are often ill-defined, to make himself susceptible to knowledge from whatever quarter it may blow, and for the manufacturer to realise his need for educated and alert men, to treat them generously and to increase their numbers in proportion as he discovers their beneficial effect on quality of products.

New Radium Research Laboratory

A LABORATORY for radium research, with special reference to the study of the chemical effects of radium radiations, has been established in Washington, U.S.A., by the Department of the Interior under the direction of the Chief of the Division of Mineral Technology, of the Bureau of Mines. This work has hitherto been conducted at the Rare and Precious Metals Station of the Bureau of Mines at Reno, Nevada. Prior to transfer of the radium equipment to Washington, the following reactions produced by alpha radiation were studied:—Decomposition of carbon monoxide; the reaction between carbon monoxide and oxygen; reduction of carbon monoxide by hydrogen; reduction of carbon dioxide by hydrogen; reaction between methane and oxygen; and decomposition of methane. The final gaseous mixtures resulting from several of these reactions await analysis, which will comprise the first stage of the experiments to be done at Washington. The main programme includes the study of gaseous reactions produced by alpha radiation from radon (radium emanation). Among the first reactions to be studied will be the radiation, respectively, of ammonia and of a mixture of carbon monoxide and hydrogen.

Iodine Manufacture in Japan

IODIDE compounds are principally manufactured in Japan in a crude state along the coast of Hokkaido, Miye Prefecture and around Nagasaki, the districts where the kelp from which the iodides are extracted is found. The crude iodides are refined and manufactured into potassium iodide, sodium iodide, iodine, iodoform, in Osaka and Tokyo.

Metallurgical Section

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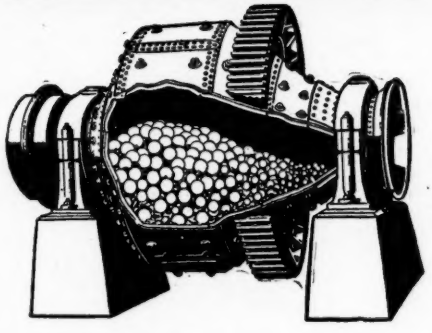

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Monthly Metallurgical Section

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NOTICE.—Communications relating to editorial matter for our Monthly Metallurgical Section should be addressed to the Editor, THE CHEMICAL AGE, *8, Bouverie Street, London, E.C.4. Communications relating to advertisements and other business should be addressed to the Manager. Contributions will be welcomed from correspondents on any points of interest to metallurgists bearing on works practice or current research problems.*

Metallurgists and Chemists

FROM remarks from time to time dropped by those holding administrative and managerial posts in connection with metallurgical works, it is not difficult to gather that the analytical and works chemist in this particular branch of industry has at last come to be recognised as something more than an auxiliary unit whose advice is tolerated but seldom endorsed or acted upon. In this respect the metallurgical industry merely provides a modern parallel with almost any other industry of importance, and though the general introduction of scientific methods founded on chemical and physical principles may be a compliment to the present-day chemist his recognition is also a compliment to those who have the foresight to appreciate that his utilisation is a direct asset to undertakings which primarily exist for the purpose of making profits. Only recently we were studying the opinions expressed by the general manager of a well-known iron and steel works in this country, and were struck by his statement that any progressive blast-furnace plant should be equipped with its own laboratory and chemists on the site, and the duty of the chemical staff should be to keep the manager immediately informed of any change in the analysis of any of the materials used in the furnace. Of all exact metallurgical processes the reduction of iron in the blast furnace is probably the one which has been controlled in the crudest manner. Yet the reactions involved are undoubtedly complicated, and unless satisfied with chemical accuracy regular working of the furnace cannot be expected. To-day supplies of ore may be drawn from a multitude of different sources, and it is impossible for the most experienced of overseers to burden his furnace with sufficient accuracy merely by visual inspection. And was it not Mr. Fred Clements who once said that many of the practical dislocations which occur are directly attributable to incorrect burdening? So that the blast-furnace manager (realising this possibility) carries more fuel than he knows his furnace requires, the excess being a burnt-offering to show his respect to the Unknown. Few will disagree with the rebuke, but it is the chemist who holds the key to the unknown and who can cut down the outlay on the burnt-offerings.

A Law of Inverse Squares

PROFESSOR TURNER, in his presidential address to the Institute of Metals, at the annual meeting on March 12, made a very valuable and important contribution to science by the enunciation of a new law, the existence of which, although long suspected, has not until now been definitely formulated. It is that, in many cases, the permanent value of a communication varies inversely as the square of its length. The practical application of this law supplies a direct and simple mode of dealing with a condition of acute "tangle" which bids fair to paralyse the activities of some of our technological institutions by the simple process of depleting their funds.

As a broad generalisation it may frankly be said that most papers read before most institutions are too long. There are also too many of them, and the general standard is not as high as it used to be years ago. The cost of printing and paper, and of reproducing illustrations, many of which have to be redrawn, at additional expense, because unsuitable in the first instance, is exceedingly heavy. Many of the papers are of ephemeral value, and some are of no value at all. It may be of interest to attempt a rough classification of the categories into which they fall. The best and most important are those by the acknowledged masters of their subject, the big men who know what they are writing about and have the experience which teaches them what is germane, and what may be omitted. Such papers, announcing new discoveries, or throwing fresh light on obscure problems, rarely err in being too long. In the second category may be placed papers by new or comparatively new men, who may have new matter of importance to describe. Such papers often require expert pruning. The third category is perhaps the most troublesome. This consists of—often admittedly—students' work; an account of some not very important research carried out for a thesis. Some of this work is put forward directly in the student's own name; some of it is "fathered," more or less by the professor in whose laboratory the work has been done. Such papers often begin with the prescribed rehearsal of what has been done before by earlier investigators, after which certain experiments are described, their results are recorded in tables, as well as plotted in graphs—an often quite unnecessary reduplication—and finally the paper winds up with a number of photomicrographs, of which long and detailed descriptions appear in the text. This again is, as often as not, a perfectly needless reduplication; it is not invariably necessary to accompany a description of a structure with pictures of constituents which everyone knows and can take for granted. Not all such papers are, by any means, valueless; they are, on the other hand, seldom of sufficient value or merit to justify their publication by the central or leading institutions dealing with their subject matter. Their proper place is the local association. It is something of an impertinence to assemble the experts of a great industry to listen to the elementary "thesis-work" of their juniors.

The Izod Impact Test

AN example of the Student paper which affords an exception to Turner's Law, is the paper by Mr. Bunting, read at the Institute of Metals meeting on the brittle ranges in brass as shown by the Izod impact test. The research falls into the category of those which are of direct practical application and throw new light on known facts. The discussion which ensued on the reading of this paper showed effectively the interest it aroused.

A possible remedy for the state of affairs which admittedly exists in the plethora of papers of mediocre interest put forward for reading before institutions of established technical importance might lie in publishing them in comparatively brief abstract, and filing the original manuscript for reference. When an investigator arrives, rightly or wrongly, at a conclusion which is in conflict with accepted views, it is manifestly unfair to him to suppress the often voluminous details of experiments, the tabulated results, and diagrams by which alone the soundness or unsoundness of his conclusions has to be determined. A summarised statement of the results would, however, often suffice to enable critics to form some judgment as to the nature of the evidence relied on. Much time and much expense might be saved by the adoption of some such method.

Corrosion and Scaling in Modern Boiler Practice

Notes on Causes and Prevention

The subject of boiler corrosion and scaling is one in which many engineers and metallurgists have been vitally interested for a number of years, and, speaking generally, the present position is far from satisfactory. Compared with many other sides of metallurgical practice, a comparatively small amount of work has been done on this subject by the manufacturer himself, with the result that he either does nothing at all to his boilers or else uses one of the many "cure-alls" which are on the market, and which, incidentally, are sold at fabulous prices. To illustrate this from the writer's experience: a certain firm were paying as much for a preparation as it would cost them to re-tube their marine boilers every year. Incidentally, these particular boilers should require to be re-tubed about every ten years under normal working conditions, and, apart from the cost, very doubtful results were being obtained from the use of the preparation.

Feed Water

The question of suitable feed water to boilers is one of vast importance, and every individual case should be investigated and judged on its merits because of the many and varied types of water and boiler conditions.

The three troubles in boiler practice are salts in solution in the feed water, dissolved gases in the feed water, and occluded oil. All waters contain salts in solution—some harmless and some distinctly harmful—and their removal or conversion to an innocuous state should be performed in some fashion or other before the water is fed into the boilers. Undoubtedly, the ideal plan, wherever possible, is to condense the steam; but this is only possible in such a case as a power system when the steam can be led direct from the turbines to the condenser. Under these conditions as much as 90-95 per cent. of condensate may be recovered and fed back to the boilers, and if the "make-up," which is lost through feed pumps or other auxiliaries is derived from a suitable type of evaporator, then the boiler plant can be fed entirely by distilled water.

Hardness of Water

Hardness of water is divided into two classes—viz., temporary and permanent. The former, consisting of the bicarbonates of calcium and magnesium can be mainly removed on boiling; the bicarbonate of lime is completely removed by precipitation as calcium carbonate, whilst the magnesium bicarbonate is only partially removed, due to the somewhat higher solubility of magnesium carbonate. So that if the feed water is preheated by, say, waste steam jets, considerable removal of temporary hardness takes place by precipitation in the feed tank. Softening plants remove temporary hardness by the extraction of carbon dioxide from the bicarbonates and consequent precipitation as the normal carbonates; in this case also the higher solubility of magnesium carbonate has to be remembered.

Permanent hardness is the term given to the chlorides, nitrates and sulphates of lime and magnesia; these salts are not precipitated on boiling, so that some chemical treatment is necessary to effect their removal or conversion to innocuity. If fed to the boilers they may be the cause of a whole host of troubles. On concentration of the water they will separate out and form a hard, crystalline scale on the plates and tubes of the boiler, and every thickness of an eighth of an inch of scale on the heating surface means an increase of approximately 25 per cent. in the fuel consumption. The loss due to scale alone in Great Britain is estimated at five million tons of coal per year.

In addition to scale-forming tendencies there is the more important difficulty—corrosion. Magnesium chloride has a great tendency to hydrolyse at the temperature and pressure of the boiler with the production of free hydrochloric acid, thus—

$$MgCl_2 + 2H_2O = Mg(OH)_2 + 2HCl.$$

The magnesium hydroxide is deposited as sludge, whilst the free hydrochloric acid attacks the boiler plates, forming iron chloride according to the following reaction—

$$2HCl + Fe = FeCl_2 + H_2,$$

and the iron chloride is acted upon by water with the formation of black oxide of iron and liberating free hydrochloric acid again, thus:— $FeCl_2 + H_2O = FeO + 2HCl$,

and as a result of this reaction the corrosion proceeds further, and once corrosion is set up the cycle of reactions causes it to flourish. In the presence of free oxygen red rust is produced instead of the black oxide of iron.

This set of conditions is likely to exist where no magnesium chloride is present, but where the water contains magnesium sulphate along with sodium chloride. Interaction is likely to take place between these two salts with an interchange of radicles, thus:—

$$MgSO_4 + 2NaCl = Na_2SO_4 + MgCl_2,$$

and there is consequently a likelihood of subsequent hydrolysis of the magnesium chloride produced. This hydrolysis is practically negatived in the presence of free alkali, and the one most commonly used is sodium carbonate.

Softening

Softening, or the removal of the hardness of waters, is mostly carried out by means of either sodium carbonate alone or sodium carbonate along with lime.

Soda is capable of removing calcium salts, but not magnesium salts, and hence the necessity for the use of lime. The softening, which can be performed either inside or outside the boiler, is brought about by the following typical reactions:—

Temporary Hardness $CaHCO_3 + Na_2CO_3 = CaCO_3 + NaHCO_3$ pptd.

Permanent Hardness $CaSO_4 + Na_2CO_3 = CaCO_3 + Na_2SO_4$. pptd.

$MgSO_4 + Na_2CO_3 = MgCO_3 + Na_2SO_4$.

$MgCO_3 + Ca(OH)_2 = CaCO_3 + Mg(OH)_2$ pptd.

However, there are no two opinions as to where the softening should be performed, namely, outside the boiler, for if performed inside the likelihood of priming and similar trouble has to be met with. Very elaborate softeners are at present on the market and the mechanical side of them—apportioning gear, etc.—is almost perfect; but from the chemical side they are apt to be neglected—if the firms who made the softeners supplied a chemist with each one, then all would be well—for usually a works chemist is too busy with other matters to test the softener and water every day and thereby keep up its efficiency, with the result that the softener falls into disrepute and ceases to function efficiently.

As opposed to this method of treatment there is the colloid process, whereby some material of a colloidal nature is added to the boiler; the function of some protective colloids is very remarkable, and in a boiler they tend to keep the salts in a jelly-like form or "sol" condition instead of allowing them to deposit in the form of crystalline scale. This process has much in its favour—it is very easy to manipulate; but the writer is of the opinion that it is of little value in its entirety, but is most useful when coupled up with some kind of softening process.

Dissolved Gases

The question of dissolved gases is one of utmost importance, for most waters, whether town's supply, river or spring, contain something like 6 to 8 c.c.s per litre of dissolved oxygen along with varying amounts of dissolved carbon dioxide. Various processes are available for the very necessary process of degasification, the commonest method in use being that of adding some tannin product to the feed water, for this has the effect of dissolving the oxygen present. This process, however, does not affect the carbon dioxide, which is commonly supposed to be innocuous in the absence of oxygen. The most usual process for the removal of both is that whereby the gases are actually extracted through an ejector by means of temperature and vacuum. This latter process has an obvious disadvantage in that a separate plant is required, and the best results are obtained from it on a power system where the only treatment necessary is that of degassing. The

interposition of a degassing plant between the condenser hot-well and boilers renders the whole system wellnigh perfect, and wonderful results are being obtained by this means on various power stations in different parts of the country.

Oil

The presence of oil, where feed pump cylinder drains have been led into the feed tank, or oil creeping along a turbine shaft to the low pressure gland and so being drawn into the condenser, is a great source of trouble in boilers, due to its protective action on the plates and consequent overheating One example in the writer's experience is of a boiler plate sinking three-quarters of an inch, due to accumulated fat on the furnace crown of a Lancashire boiler.

The commonest process for oil removal is the alumino-ferric and soda process, which is simply an application of colloids.

However, the writer is of the opinion that oil can be successfully kept out of the feed water by keeping all glands in good condition and running the drainings from the pump cylinders away from the feed tank—on no account should the drainings have access to the feed tank. This is simply an application of the old adage "Prevention is better than cure," and by this means all oil troubles can be safely eliminated.

Conclusion

In conclusion, the most widely applicable process for, at any rate, all ordinary feed waters, is one in which the foregoing principles are all linked together. A solution of the following composition :—

	Per cent.
Water	84
Sodium Carbonate	6
Tribasic Sodium Phosphate	3
Sodium Tannate	4
Dextrin	3

is an admirable one for most purposes. For, to give an example, if added to the feed tank at the rate of about 1 gallon of solution to 10,000 gallons of water it will give a P_H value of about 9 to 12 to a water of the following analysis :—

SiO_2	0·30 pts. per 100,000
Fe_2O_3	0·20 ,, ,,
$CaCO$	1·0 ,, ,,
$CaSO_3$	1·4 ,, ,,
$MgSO_4$	0·8 ,, ,,
$MgCl_2$	1·5 ,, ,,
NaCl	1·45 ,, ,,
Oxygen	6 c.c.s per litre.
Carbon Dioxide	3 c.c.s ,,

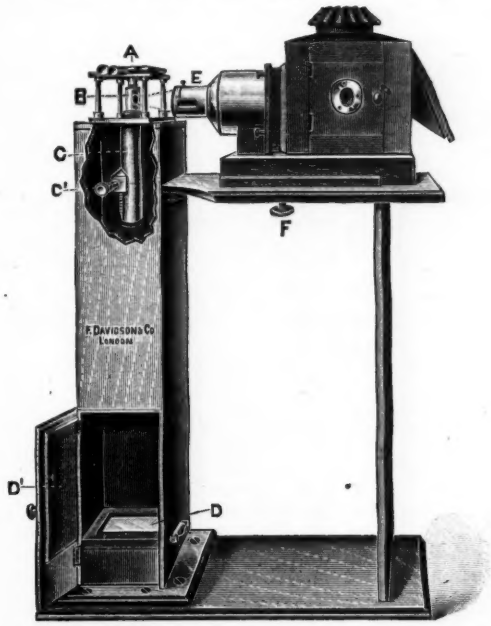
A P_H value of 10 is equivalent to an alkalinity of about 6 pts. per 100,000 of free sodium carbonate and is about ideal for ordinary boiler working. In addition, the sodium carbonate and phosphate have the effect of softening the water, and the phosphate increases the surface tension and thereby is a militant against any possibility of priming. The tannin product dissolves free oxygen, and the dextrin has the effect of colloidalising the scale-forming salts which have not been precipitated by the softening reagents. So that the net result is that no active corrosion can take place in the boiler, and also that little or no hard scale can possibly be formed ; the latter simply becomes a sort of sludge, and much of it can be removed by blowing down at regular intervals ; and when no corrosion is taking place in a boiler and the scaling tool is replaced by the wire brush and hose-pipe, then the boiler engineer can consider that his troubles are as far reduced to a minimum as it is humanly possible to reduce them.

Temperatures in Charcoal Furnace Practice

In a study of temperatures encountered in charcoal iron-furnace practice, being conducted by the Department of the Interior at the Minneapolis Experiment Station of the United States Bureau of Mines, samples of charcoal and slag have been obtained from four charcoal iron furnaces for determining the amount of sulphur in the fuel and that carried off in the slag. The results of these analyses will be incorporated into a report comparing the sulphur which is present in the materials used in charcoal and coke furnaces and the temperatures which are attained. Due to the relatively small amount of sulphur in charcoal, little attention is given to the quantity of this element in the raw materials.

Rapid Metallographic Photography

It is a tiresome business, as a rule, to prepare a photomicrograph of a metallurgical specimen. A slice has to be taken of the metal and mounted, the microscope and camera lenses adjusted, the exposure calculated, etc., so that in some cases it is hardly worth the trouble involved to obtain a photograph. We recently had an opportunity, however, of examining a beautiful piece of apparatus designed by Dr. F. Rogers which standardises the whole of the steps, and enables photographs of metallic specimens to be taken in an incredibly short space of time compared with the usual methods. This result is obtained partly by avoiding altogether the preparation of a microscope slide as generally understood, and partly by an adaptation of the "Davon" super-microscope, which has already been described in these columns. An instrument on this principle is mounted vertically, and the specimen to be examined is placed on the top, at A. The specimen can be any small piece of the metal with a flat polished face, so that its preparation is only the work of a minute or two. Illumination is obtained from an ordinary lantern with condenser



through a cover-glass reflector (B) to the specimen, which is projected through the super-microscope system on to the photographic plate at D. By means of a light-tight door the projected image is clearly seen and may be focussed, but it should be clearly understood that there is no need for refocussing for different specimens, since they replace one another in the same plane. The makers, F. Davidson and Co., 29, Great Portland Street, London, W.1, supply the instrument, which is known as the "Metalworks" outfit, to produce fixed magnifications of 100, 250, or 500 diameters. As the price is extremely moderate, being only £37 10s. without the lantern, it should prove a most valuable instrument in all metallurgical works, but particularly in the smaller ones, where it is not possible to have anyone fully employed on metallographic examinations.

A Big Vickers Contract

The municipality of Copenhagen has just placed a very large contract for complete boiler house equipment for the municipal electric power supply station with Vickers Spearing Boiler Co., Ltd., London, an affiliated company of Messrs. Vickers, Ltd. The contract includes boilers of 2,000 h.p. each, with economisers, stokers, air heaters, superheaters, mechanical stokers and all accessories. The whole of this plant will be manufactured in Great Britain. The contract was obtained in open international competition, and was awarded on the merits of the proposal.

Metallurgical Topics: Monthly Notes and Comments
From Our Own Correspondents

"Academic" Studies Materialising

THE work of Laue, Friedrich and Knipping, Bohr and Planck on crystal and atomic structure, so admirably developed and supplemented by our fellow-countrymen, Beilby, Rutherford and the Braggs, is having a direct and immediate repercussion on the theories and concepts of modern metallurgy. This repercussion must profoundly affect and modify practice, so we have here an example of the influence of purely scientific and mathematical research work, in other words, too often hastily dismissed as "academic" upon current technology. At the meeting of the Institute of Metals, two papers devoted to these aspects of metallurgy were read: one by a brilliant trio of young Swedish scientists, Jette, Phragmen and Westgren, and the other by Professor F. C. Thompson and W. E. W. Millington, of Manchester University. As in point of chronological sequence, x-ray work on metals affords the basis of structural investigation and its theoretical interpretation, it may be well to deal with Dr. Westgren's paper first, the more so as it shows in a very interesting manner how the earlier work on iron structure, presented before the Iron and Steel Institute at the May meeting in 1922, has been carried a step further and the same methods employed to elucidate the constitution of copper-aluminium alloys.

X-Ray Work on Binary Alloys

WHAT chiefly emerges from Dr. Westgren's paper is the confirmation given by x-ray examination of a series of copper-aluminium alloys, of the equilibrium diagram plotted some 17 years ago by Edwards and Carpenter, subject to some slight rectifications in regard to the 12 per cent. aluminium alloy, discrepancies in which had already been noted by other observers. This confirmation affords evidence not of the stability and truth of the phase rule, which have scarcely ever been in doubt, but of the intrinsic accuracy and value of the x-ray examination methods, and therefore of the positive truth of much of the recent physico-mathematical theory as to atomic and molecular structure upon which such methods are based. The newer theories have not been long enough established for them to have been firmly assimilated by metallurgists in general, so that papers of this kind which emphasise the concordance and harmony of their results with those obtained by older and more familiar methods will help greatly in their general dissemination and acceptance. The paper is accompanied by Debye photograms and Laue spectrograms, which with the mathematical reasoning adduced lend authority to the conclusions. Difficulties in manipulation have prevented the development of experimental work on the β phase, but the α, δ and γ phases are satisfactorily brought into evidence and their nature illustrated.

Lattice Structure and Strain

IT is to be regretted that Sir William Bragg was unable to be present at the meeting, but he was ably represented by Dr. H. Weiss, who took part in what proved to be an exceedingly interesting discussion. The powder method was, he pointed out, one which might before long be found useful in giving qualitative results as to the presence or otherwise of constituents too small to be detected by the microscope, but, for accurate work in research, crystals were alone advisable. Dr. Rosenhain thought the x-ray spectrum, in the case of such alloys, would probably be that of the predominant phase, and doubted whether the method adopted by the authors of merely allowing the alloys to cool slowly from fusion was satisfactory as the resulting solid solutions would probably not be homogeneous. After all, the subject may be said to be still in its infancy, and a great many points will require to be cleared up before metallurgists can accept the results of x-ray examination as conclusive. It has already been pointed out by a number of observers, as was stated at the Jubilee of the Physical Society last month, that the wave length of scattered rays differs from that of the incident rays, a function not as yet allowed for in the mathematical computation of photograms of diffracted rays. Also, it would seem natural to conceive that lattice distortion due to strain may considerably modify the results, and as yet little or no work has been done from this point of view. The author's method of slow cooling would at least have the advantage of "normalising" the structure of their alloys, and so affording, as far as possible, spectrograms of lattices free from the distorting influences of internal strain.

Atomic Movement in Stressed Metals

THE "atmosphere" of the paper by Mr. Millington and Professor F. C. Thompson is totally different to that of the paper just discussed. We are no longer embarked on the smooth deep waters of experiment and observation backed by mathematical evidence, but on a troubled pool of speculation. The paper is, nevertheless, to be warmly welcomed as showing that the authors possess that valuable gift, scientific imagination, although the time is not ripe for such speculations to be taken seriously. It suffers from a tendency evinced in an avalanche of recent pseudo-popular text books, to seek to explain in simple language phenomena which cannot be so explained, and to strain analogies in the process. That stresses may be transmitted in a way which can be demonstrated by the movement of layers of ping-pong balls over and under one another is not necessarily untrue; there is some evidence that atomic systems are spherical, or elliptoid. To speculate on the mechanism of the glide is to form concepts which may be both helpful and interesting, yet it may be doubted whether the results of such speculations can be properly applied to the concrete and specific explanation of definite occurrences of fatigue failure in the brass tubes of a particular feed water heater. The direct issue involved is matter of fact, and the conclusion that failure, in the particular instances adduced, is due to the formation of bars identical with Neumann bands —or bars as the authors prefer to call them—is legitimate matter for discussion, the more so as the mechanism of their formation is understandable under ordinary and accepted modes of reasoning. The analogy of the incidental subject matter of the paper was felt by many of the speakers to be strained and unnecessary. Apart from all other considerations, it introduces fresh difficulties of its own, which Dr. Rosenhain pointed out in his lucid criticism of the paper. Miss Elam, whose status in metallurgy is recognised and who, like Dr. Rosenhain, has the gift of lucid expression, thought likewise. All this notwithstanding, the paper promised by the authors for the forthcoming meeting of the Iron and Steel Institute will be looked forward to with interest and pleasure, for its conception is brilliant, and, provided the authors are prepared to support it with a proper amount of actual experiment, it may well serve to stimulate enquiry into the actual mechanism of the movement of particles of stressed material. It is possible that results of value might emerge from experiments in which for example, bicycle balls, magnetised to supply the elements of cohesional forces, were subjected to the methods adopted by Professor Thompson and Mr. Millington.

Statistics of the Iron and Steel Industries

VIEWED as a whole, the "Statistics of the Iron and Steel Industries" just published by the National Federation of Iron and Steel Manufacturers (Caxton House, Westminster; price 5s. 4d., *post free*) are exceedingly well compiled and distinctly useful. Incidentally, however, it might be questioned whether it is worth while delaying so long the publication of the figures relating to British production merely because those relating to certain foreign countries have not been available earlier. The figures relating to the French production of steel ingots are grouped under the headings "Thomas" "Bessemer" and "Martin"; and those for the Belgian output under the headings "Thomas Converter," and "Open-hearth." These headings correspond with the returns made in the respective countries of origin, but it might be as well, as far as possible, to provide more systematised headings for English readers who may not always know that "Martin Steel" corresponds with open-hearth steel (whether acid or basic), whereas "Thomas" steel and "Bessemer" correspond respectively with basic bessemer and acid bessemer steel respectively. The compilation of trade statistics is in any case a thankless task. The least that can be said of those in question is that the Federation and its statistical officer, Mr. Birkett, are to be congratulated on the way they have discharged their task.

A New Sponge Iron Process

A NEW process for the production of sponge iron has been developed by the U.S.A. Department of the Interior, in co-operation with the University of Washington, as the result of experimental work conducted during the past three years at the Northwest experiment station of the Bureau of Mines, Seattle, Washington. Sponge iron, because of its porous structure and consequent exposure of an extremely large surface of metallic iron, is especially adaptable to the precipitation of copper, lead, and other metals from their solution. The development of a process by which sponge iron may be made cheaply from iron ore and low-grade coal and afterwards converted into iron and steel products by treatment in the electric furnace would be of especial economic importance to the Pacific Coast region of the United States, a territory remote from the larger iron and steel producing centres, but endowed with cheap electric energy to take the place of the expensive coke that would otherwise have to be utilised in iron and steel production.

On account of the removal of oxygen from iron oxide ore, the structure of sponge iron is very porous, an extremely large surface of metallic iron being exposed. As a result, sponge iron is an active reducing agent and precipitates metals from solution with greater speed than do the more massive forms of iron, such as steel scrap and iron turnings. The Bureau of Mines considers that sponge iron will probably be used extensively for the precipitation of copper, lead, and other metals from hydrometallurgic solutions. The many advantages afforded by the use of sponge iron for this purpose should cause an expansion of processes involving leaching and precipitation. Its value as a reducing agent should cause sponge iron to replace other forms of metallic iron now used as a reagent in certain chemical production processes. New processes utilizing cheap sponge iron may be developed to take advantage of the great reactivity of metallic iron in this form. These processes could reconvert to sponge iron any iron oxide obtained from the reaction.

Conversion to Steel

THE possibility of making sponge iron and converting it to steel without passing through the stage of pig iron production has been suggested from time to time, and hundreds of so-called "direct steel" processes have been proposed or tried during the past century. Unquestionably, the production of steel from sponge iron has theoretical advantages over present standard methods. Moreover, the production of both steel and pig iron from sponge iron has economic advantages in certain localities. In regions remote from iron and steel producing centres, where coke is expensive and electric energy cheap, sponge iron made cheaply from iron ore and low-grade coal can probably be converted into iron and steel products by treatment in the electric furnace in competition with imported goods. The fact that both the electric melting and sponge iron production processes can be conducted economically on a small scale makes such a proposed process particularly advantageous in communities that do not consume much iron or steel. Electric furnace processes, being inherently expensive, are advocated for the production of iron and steel only where unusual conditions prevail.

There is some hope in the opinion of the Bureau that sponge iron can be briquetted and melted in the open-hearth steel furnace without too much oxidation. If this could be accomplished a much larger field of usefulness would be opened up for cheap sponge iron. In the process developed by the Bureau of Mines and University of Washington investigators, almost any type of iron ore is satisfactory for the production of sponge iron. Experiments conducted at the Seattle station showed that similar results are obtained with magnetite, hard and soft hematite, limonite and sintered hematite. It is probable that sponge iron will be made from such by-product materials as flue dust, pyrite cinder, various slags of high iron content, and iron oxide sludge. The Bureau of Mines process consists in passing a mixture of iron ore and coal through a rotating kiln heated at one end to a temperature sufficient to convert iron oxide to metallic iron, discharging, cooling, and separating the sponge iron from the residual coke and siliceous material on a magnetic separator. Details of these experiments are given in Serial 2578, by Clyde E. Williams, Edward P. Barrett, and Bernard M. Larsen, which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D.C., U.S.A.

Malleable Iron Tests

IN the specification of malleable iron castings, recently issued by the British Engineering Standards Association, greater importance is attached to mechanical than to chemical tests. This will satisfy metallurgists especially, as the ultimate tensile strength required is comparatively low. It must not be less than 20 tons per square inch, while the minimum elongation in 2 in. must not be less than $7\frac{1}{2}$. It is quite usual, as a matter of fact, to obtain an ultimate strength of over 23 tons, although the Admiralty test is only 18 tons per square inch of area in tensile strength, with a maximum elongation of $4\frac{1}{2}$ per cent. in a length of 3 in. The bend test of the British Admiralty is also different from that proposed by the Engineering Standards Association. The Admiralty recognise that a bar shall withstand bending at an angle of 90 degrees round a radius of 1 inch without sign of fracture, while the Association test bar of the same dimensions—1 in. by $\frac{3}{8}$ in.—is bent round a $\frac{3}{4}$ in. radius.

There are fewer than 250 malleable iron foundries in the United Kingdom, and the question of mechanical tests is the same practically for the whole ferrous foundry trade and it concerns the entire engineering industry. French metallurgists and foundrymen favour the Fremont-Portevin method, which consists of boring bars from a thick section of the casting. The difficulty of obtaining a bar that is representative of the casting is due to the unequal cooling of different sections, and the ultimate object of a test bar is to let engineers know the strength of the actual casting used. The International Test Bar Committee, which was formed at Paris last September, is conducting experimental work on round test bars, other shaped test bars being discounted because of the variation due to casting and cooling conditions of such bars. The diameters to be considered are to be 1·2, 1·3, 1·4 and 1·5 in. They are to be cast on end, one in a mould 21 in. long, and tested between 18 in. centres. The moulds are to be either dry sand or cores and the test bars are not to be tumbled or machined. Twelve bars are to be cast from a heat, six to be tested by the maker, and six to be sent to the Committee.

Growth of Canadian Mineral Production

PROGRESS has been very marked in the mineral production of Canada during 1923, and several new commodity production records were established, while the output as a whole advanced 16·1 per cent. in value over the corresponding figures for last year, and only about 7 per cent. below the record value of $228,000,000 attained in 1920. New output records were established for coal, lead, zinc, asbestos and the value of cobalt. Copper production, while considerably below the record war-time outputs, was more than double the tonnage produced in 1922, and amounted in all to 87·94 million pounds. Nickel reached a total of 62·45 million pounds as against 17·59 million pounds last year, and while gold and silver were both less than in 1922, the outputs were greater than in many other recent years and together accounted for values amounting to 36·80 million dollars. The principal mineral-producing province of Canada in 1923 was Ontario, British Columbia came second, while Alberta was third.

Threatened French Metallurgical Strike

IT is stated that the French Congress of Factories organised by the extremist syndicates in the metallurgical industry and the aeroplane-building industry has adopted, in spite of the opposition of a large minority, a decision to call a general strike in the iron and steel trade on a question of wages. A special commission has been appointed to make all arrangements necessary to carry out the decision at a convenient date.

Ironworkers' Wages Advance

WAGES regulated by the sliding scale under the Midland Iron and Steel Board will be advanced from Monday, April 7, by five per cent. as the result of the rise in the selling price during the first two months of the year. Ironworkers will thus be receiving higher pay than they have had since the early summer of 1922. The plussage on base rates becomes 60 per cent. Employers complain they have had no equivalent, inasmuch as production costs advanced more markedly than selling prices.

Trade, Commerce, Finance: The Month in Review

From Our Northern Correspondent

THE tone of the iron and steel market during the month of March can hardly be described as cheerful. Rather it has reminded us of the dispiriting months of last year; and already trade papers are beginning to talk of the depression which has set in, and which may last until the autumn!

It is, to say the least, disheartening to see the industry slipping back again, through causes for which the steel makers are not responsible. The new year opened optimistically, and there seemed to be the right atmosphere to encourage steady progress. The one thing necessary to make that progress was industrial peace, and it is just the lack of that one thing that is taking the life out of the industry again. First we had the railway strike, then the dockers' strike, and now the threat of a coal strike, each in turn and the last most of all undermining that confidence on which a healthy state of trade must depend. The consumer, at a loss to know which way things are going, prefers to keep back his orders other than for his bare day-to-day requirements. Manufacturers, anxious to find work to keep the mills going, compete keenly for what work there may be, prices weaken, and there is set up a condition conducive only to further weakness.

One wonders how long it will go on and what the end will be. The steel manufacturers have not yet lost sight of the practical difficulties which were the result of the last coal strike. Not only was there the general loss consequent on the closing down of works, but the damage done to steel furnaces by that enforced stoppage must be reckoned in the hundreds of thousands of pounds in the aggregate. It is to be feared that a repetition of the trouble would be fatal to some of the works, who are already finding it a struggle to carry on. Hope of a settlement with the miners has not yet been abandoned, and unless extreme counsels are allowed to overrule the disaster may yet be averted.

The Wages Problem

There is also a movement afoot for exacting increased wages for the lower-paid men in the steel works. That question will receive serious and sympathetic consideration by the employers. It is certain that the industry cannot stand any increase in its wages cost at present, yet it must be admitted that certain classes of men in the works are receiving wages which are insufficient to maintain a home. A solution of the problem may be found along the lines of a more equitable distribution of the total wages, so as to bring the two extremes nearer together; also by a reconsideration of the hours of working. In dealing with these matters there needs to be an appreciation of the difficulties with which the steel maker is confronted. There is scarcely a steel works in the country which is not losing money on the manufacture of steel. Such a condition cannot be prolonged indefinitely, and the end will come quickly if organised labour pursues a policy which will materially increase these difficulties.

Not only the labour troubles, but the disorganised state of the Continental market has added to the uncertainty here. The rapid depreciation of the franc caused some anxiety, but the suddenness of it prevented much actual business. The equally sudden appreciation has had a similar effect. Moreover, the Continental works are booked well ahead, and cannot offer deliveries early enough to meet the English requirements. On the other hand, the demand for English iron and steel on the Continent is much below the normal. The works on the North-East Coast and in Scotland have felt the effects of this more particularly.

The reduction of the Reparations Duty from 26 to 5 per cent. has made the way easier for German competition. We are approaching the time when this competition will be keen and constant as of old. The majority of the Ruhr works are making good recovery and are getting near to normal working. The control of the vast resources for the manufacture of iron and steel, which is in the hands of the French and German owners, is a grave menace which has not been lost sight of by the English makers, and in this connection it is interesting to note that there has been an unofficial visit of representatives of the French, Belgian and Luxembourg steel makers to this country to talk over the position.

Pig Iron Market

The pig iron market has not been good. Cleveland prices were reduced at the beginning of the month owing to the foreign competition, and the Northampton and North Staffordshire brands followed suit. The Lincolnshire and Derbyshire irons remained comparatively firm. During the past week there has been a rather better demand. Cleveland prices were advanced 1s. on March 28th. Makers know, and consumers are apparently realising the fact, that pig iron prices cannot go any lower without forcing the alternative of closing down the plants. Stocks in consumers' works are practically used up, and there is a disposition to make forward contracts for the next quarter while prices are favourable. There is also a little better demand from the Continent, due no doubt to the rise in the French exchange. Fortunately the coke makers too have appreciated the position of the pig iron trade, as they have decided to retain the official price of coke at 24s. at the ovens until May 17, when another meeting will be held to decide the price for a further period.

Whatever settlement is arrived at between the miners and the employers, it is certain that the wages will be increased, which means an advance in the price of coal, and we shall again be in the anomalous position of paying more for coal than for coke. This is in fact already the case. The fear of a strike has occasioned such a rush for supplies that it is almost impossible for works to obtain their regular deliveries, and absurd prices are being asked for odd lots that are available. The poor steel maker is once more left in the lurch. He is faced with reduced prices for his manufactures, while the cost of production is increasing.

Prices of Plates

During the month the associated plate makers have met to discuss the price of plates, and have decided that no official alteration shall be made at present. The ruling price is £10 5s. basis and orders are readily taken at that figure, or even less. There is not much demand for heavy plates. Thinner plates and sheets are stronger, and it is possible to obtain more than the usual list extras for these. There are some good orders for them for the motor trade in the Midlands, but one or two of the Scotch works are competing very keenly for them, and are taking them at prices which, after deducting the heavy carriage, must entail considerable loss. The Scotch works generally are very short of orders, and there is a lot of plant there standing idle.

The Small Bar Association has not survived long. Nominally the Association still exists, but for all practical purposes it is at present dissolved, as members are free to quote what prices they like. This turn of events is not altogether surprising. In good times there is no difficulty in maintaining prices, but when trade is bad it is the usual experience that undercutting is resorted to, in roundabout ways, and unless an improvement in trade sets in there is the inevitable result as we now see it. Naturally prices have fallen, and to-day's quotation is about £10 per ton or even less. There is, however, a wide variation in quotations for the moment, as the market is rather unsettled.

These reductions may be necessitated by the competition from the re-rollers, who are using either cheap seconds quality billets from the English works, or even cheaper foreign billets, by which means they are enabled to underquote the English bar makers. It is useless, however, to try to make English bar prices compete with the Continental prices: the difference is too great to be bridged. It is no use trying to capture this trade from the consumers, who are willing to use the cheap foreign steel. There is a considerable trade in steel bars for which foreign steel will not be accepted, and we still think it is bad policy to spoil this trade by unreasonable price cutting. It is significant that the London, Midland and Scottish Railway are putting a note on all their steel orders to the effect that only English steel must be used.

Stainless Steel

There has recently been some amount of interest in stainless steel, caused by the litigation which has been reported in the papers. An important decision has just been given

in the French Courts, revoking the validity of the patents in that country. No doubt that will lead to similar decisions in other countries. The possibilities of this steel are becoming more apparent. It has been used chiefly for luxury purposes, but its use for constructional and engineering purposes is being developed, and the prospects on these lines are very good.

The financial reports of iron and steel companies which appear in the papers from time to time are not encouraging. The good ones are the exception. The figures bear convincing testimony to the unhappy state of the steel trade. It is only a question of time when more than one of the hitherto flourishing concerns will have to readjust their balance-sheets and make a new start. Two of the large engineering firms have taken this course during the past few days, and no doubt others will follow. After all, it is the best course. A huge debit to profit and loss account is like a millstone round the neck, and it is advisable to write it off boldly as soon as there is a definite prospect of making ends meet.

Some Inventions of the Month

By Our Patents Correspondent

Aluminium Alloys

THE British Aluminium Co., Ltd., and A. G. C. Gwyer, of London, have patented a process for converting "normal" aluminium-silicon alloys into "modified" aluminium-silicon alloys of improved physical properties, but without the use of fluorides of alkali metals. In this invention, the flux used consists of an alkali or alkaline earth oxide or hydrate. A "normal" aluminium-silicon alloy containing 10 per cent. of silicon is melted and treated with about 5 per cent. by weight of sodium hydrate. The latter is added in small portions which are forced to the bottom of the molten metal, and a strong reaction with rise of temperature takes place with each addition. If an alloy is treated in which partial "reversion" has taken place it is found that the quantity of sodium hydrate required may be considerably reduced—*e.g.*, to 2 per cent. See Patent No. 210,517, dated October 31, 1922.

Preparation of Ores for Leaching Process

A PROCESS has been invented by C. Hennes, of Berlin, for roasting ores in such a manner that the metals are readily recovered from the gangue by a subsequent leaching process. This is done by adding an oxidising medium such as saltpetre to the ore during roasting. In the case of ores such as pyrites containing lead, which cake together on roasting, the ore is given a preliminary roasting and is then disintegrated and roasted again with the addition of saltpetre. In the case of ores containing pyrites and silver in the form of silver glance, native sulphide, grey silver, or fahl ore (tetrahedrite) the saltpetre is added at the commencement of the roasting. In the case of complex blend ores, the saltpetre is added during the final stage of roasting. If silver containing blends and pure silver ore are treated, a muffle is preferably used for roasting to avoid contamination by the fuel. See Patent No. 210,824, dated October 10, 1922.

Cementation of Iron and Steel

AN improvement in the cementation of iron and steel according to the surface converting process has been patented by A. Gronqvist, of Copenhagen. The heating which follows the cementation process is not followed by a complete cooling in a hardening bath, but the metal is cooled only to about 300° C. The hardening bath contains sulphite lixiviation water and metal salts, and this produces a thick airtight crust of crystals on the article. The metal is then heated again to a temperature sufficient to vaporise the crystals, and is then quenched as usual. The hardening bath consists of sulphite lixiviation water of 35–50° Bé. 8 parts, disodium hydrogen phosphate 3 parts, potassium ferricyanide 0·5 part, potassium ferrocyanide 0·5 part, caustic soda 0·25 part, and water 6 to 8 parts. See Patent No. 210,870, dated November 8, 1922.

Chromium and Manganese Alloys

AKTIEBOLAGET FERROLEGERINGAR, of Stockholm, have applied for a patent for obtaining alloys of chromium and manganese low in carbon and silicon. Silicon-chromium and silicon-manganese alloys containing over 10 per cent. of silicon are first obtained by reducing the chromiferous and manganiferous slags resulting from the reduction of their ores. This is effected by means of silicon alloys of iron, aluminium, calcium, chromium or manganese. These alloys are then used for reducing the chromium and manganese ores. See Patent application No. 209,742, bearing the International Convention date January 11, 1923.

Improving Commercial Aluminium

A PROCESS has been patented by W. Rosenhain and J. D. Grogan, of the National Physical Laboratory, Teddington, for neutralising the effect of silicon which is usually present in commercial aluminium. This is done by adding a small proportion of another metal such as calcium to the aluminium to combine with the silicon, forming a compound which is insoluble in aluminium. The calcium may be added in the form of a calcium-aluminium alloy containing 8 per cent. of calcium, and the proportion would be such that 10 parts of calcium are added to 14 parts of silicon present in the aluminium. Barium or beryllium may be substituted for the calcium. As an example of this treatment, aluminium containing iron 0·14 per cent. and silicon 0·16 per cent. and having an electrical conductivity after annealing of 58·3 per cent. that of copper, was treated with 0·35 per cent. of its weight of calcium, yielding a product in which the conductivity is increased to 62 per cent. The calcium may be added during the process of producing aluminium by electrolysing alumina in molten cryolite, by adding some calcium fluoride. See Patent No. 211,027, dated August 17, 1922.

Iron and Steel Alloys

THIS process, patented by W. B. Hamilton, of Birkdale, Lancs, and T. A. Evans, of Manchester, relates to the manufacture of iron and steel alloys in which a mixture of aluminium and ordinary chrome ore is employed. The action of the aluminium is not entirely selective in reducing the iron oxide, and some of the silica is also reduced and the silicon finds its way into the bath of metal. In this invention, the quantity of aluminium employed is in excess of the chemical equivalent of the reducible metallic oxide, but only about 80 per cent. of the chromite is mixed with it. The remaining 20 per cent. of the chromite is added to a silicious lime slag in a highly fluid condition, and the 80 per cent. of the chromite together with all the aluminium is then added. The aluminium reduces all the reducible oxides, including the silica, contained in the chromite with which it is mixed. The silicon then reduces the 20 per cent. of chromite which contained no aluminium. It is thus possible to obtain an alloy which is substantially free from silicon. The operation is effected in an electric furnace with carbon electrodes, and the slag protects the molten metal from contamination by the electrodes. The same process may also be used with any reducing agent other than aluminium which is liable to reduce the silicon in the ore. See Patent No. 211,210, dated November 14, 1922.

Preparation and Smelting of Ores

A PROCESS has been patented by H. Diehl, of Darmstadt, Germany, for treating slags from lead and copper smelting furnaces containing iron, lime, magnesia, alumina, silica and some manganese, lead, zinc and silver. This material is smelted with such a proportion of lime or limestone, coke, and a chloride, that metallic iron is not obtained. The volatile metals are carried out of the furnace in the current of gases, and the greater proportion of the lead and zinc are thus obtained. The zinc product is washed by means of an alkaline wash water containing less than 0·2 per cent. of CaO. The zinc sludge is then saturated with carbon dioxide, the soluble chlorides are washed out with water, and the zinc product is calcined to remove chlorine, yielding a product which is particularly suitable for the production of zinc sulphate for electrolysis. See Patent No. 211,215, dated November 14, 1922. (Compare Patent No. 170,100, see THE CHEMICAL AGE, Vol. V, p. 634.)

Zirconium Steel

A PROCESS has been patented by H. E. Potts (communicated by Electro Metallurgical Co., of New York), for treating high-phosphorus steels to render them acceptable under the usual engineering specifications. The steels treated are those containing more than 0·10 per cent. of phosphorus for Bessemer steels, or 0·05 per cent. for open-hearth steels. It has been discovered that if zirconium is added in the proportion of about 0·02 to 0·50 per cent. of the steel, that the brittleness usually caused by phosphorus is eliminated. This beneficial effect is not due to the elimination of phosphorus, the proportion of

which is not reduced. It is also found that the zirconium-treated steel is more free from slag and oxide inclusions than ordinary steel. A large number of tests have been carried out to determine the strength and other properties of these steels, and it has been found in particular that they have a high Izod impact number compared with steel of similar composition free from zirconium; in fact, the impact number of such treated steel containing about 0·80 per cent. of carbon is about equal to the impact number of untreated low-phosphorus steel. See Patent No. 212,171, dated May 29, 1923.

Current Articles Worth Noting

We give below a brief index to current articles in the technical press dealing with metallurgical subjects.

ALLOYS.—Perkin medal address. F. M. Becket. *J. Ind. Eng. Chem.*, February, 1924, pp. 197–205. Discusses broadly the field of ferro-alloys and certain alloying metals, viz., ferrosilicon, silicon metal, ferro-manganese, ferrochromium, chromium metal, ferrotungsten, ferro-molybdenum, ferrovanadium, ferrotitanium and zirconium alloys.

Molybdenum, its alloys and its applicability as an alloying constituent. Part I. P. Powell. *Brass World*, February, 1924, pp. 47–51.

SILVER.—The tarnishing and detarnishing of silver. Part II. G. W. Vinal and G. N. Schramm. *Metal Ind.* (*N. York*), March, 1924, pp. 110–111. Causes of tarnishing and comparison of methods of removal; properties of moss silver.

ELECTRO-METALLURGY.—Developments in the separation of precious metals from their alloys. G. Eger. *Z. angew. Chem.*, March 13, 1924, pp. 137–144 (in German). Electrolytic separation of gold and silver from one another and from copper, lead and other metals.

CORROSION.—The corrosion of Muntz metal in sea water. W. Donovan and T. E. Perks. *J.S.C.I.*, March 28, 1924, pp. 72–75T. Deals with the relation between the micro-structure and "corrodibility."

The corrosive action of brackish waters on metals. T. E. Perks. *J.S.C.I.*, March 28, 1924, pp. 75–77T. Advances on theory of "varying salinity."

The natural water corrosion of steel in contact with copper. W. G. Whitman and R. P. Russell. *J. Ind. Eng. Chem.*, March, 1924, pp. 276–279. Results confirm the electrolytic mechanism of corrosion.

The electrochemical character of corrosion. U. R. Evans. *Brass World*; Part II, February, 1924, pp. 53–57; Part III, March, 1924, pp. 89–92.

SOLDERING.—Some properties of soft soldered joints. T. B. Crow. *J.S.C.I.*, Part I, March 21, 1924, pp. 65–68T; Part II, March 28, 1924, pp. 69–70T. Effect of varying conditions upon the resulting joins; theories of soldering. Bibliography provided.

IRON AND STEEL.—Metallurgical data on stainless steels. H. H. Abram. *Chem. Met. Eng.*, March 17, 1924, pp. 430–431. Investigation of their mechanical properties.

Detecting metallurgical defects in steel. F. C. Thompson. *Metal Ind.* (*Lond.*); Part I, March 7, 1924, pp. 229–230; Part II, March 14, 1921, pp. 261–262. Examination by sulphur printing and macro-etching.

Stainless iron, its manufacture and properties. *Iron Age*, February 28, 1924, pp. 649–650.

Metalloids in basic pig iron in basic open-hearth practice. Part II, C. L. Kinney. *Blast Furnace and Steel Plant*, March, 1924, pp. 150–153. Data showing the losses sustained when unnecessary quantities of silica or bases are used.

GENERAL.—The physical properties of metal at elevated temperatures. V. T. Malcolm. *Trans. Amer. Soc. Steel Treating*, March, 1924, pp. 256–275. Tensile tests at high temperatures of materials used in the construction of valves.

ELECTRO-PLATING.—Studies on electro-plating. Part II. The composition of plating solutions (concluded). W. E. Hughes. *Metal Ind.* (*Lond.*), March 7, 1924, pp. 218–220. Describes the characteristics of a good plating solution.

ANALYSIS.—The estimation of carbon in aluminium. R. Hahn. *Z. Metallkunde*, February, 1924, pp. 59–60 (in German).

Estimation of alkali metals in aluminium and aluminium alloys. Prof. Schürmann and Dr. Schob. *Chem. Zeit.*, February 23, 1924, pp. 97–98 (in German).

Simplification of the separation of zinc from iron and aluminium. E. G. R. Ardagh and G. R. Bongard. *J. Ind. Eng. Chem.*, March, 1924, pp. 297–299.

The assay of zinc ores. Use of powdered magnesium for removing copper and lead. E. G. R. Ardagh and G. R. Bongard. *J. Ind. Eng. Chem.*, March, 1924, pp. 300–301.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

DERWENT FOUNDRY CO. (1920), LTD., Derby. Registered February 18, £5,000 debentures; general charge. *£20,000. November 26, 1923.

EALING PARK FOUNDRY, LTD.—Registered March 15, £2,500 debentures, balance of £10,000; general charge. *£5,000. May 29, 1923.

FLEMING (FREDERICK) AND CO., LTD., West Vale, brassfounders. Registered February 19, mortgage, to bank; charged on properties at West Vale, near Halifax.

JONAS AND COLVER, LTD. (late SIR JOSEPH JONAS COLVER AND CO., LTD., and JONAS AND COLVER, LTD.), Sheffield, steel manufacturers. Registered March 13, £80,000 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue, £78,000; general charge. *£47,100, £180,000. November 22, 1923.

KRYN AND LAHY METAL WORKS, LTD., London, E.C. Registered March 13, £10,500 debentures, to A. E. Tilley, 8, Staple Inn, C.A.; charged on land and premises at Letchworth; also general charge. *Nil. December 31,1923.

LAMPLUGH IRON ORE CO., LTD., Whitehaven. Registered March 1, £15,000 debentures; general charge. *£10,426. October 3, 1923.

MUREX, LTD., London, E.C., smelters, etc. Registered February 29, mortgage (collateral to £31,363 5s. 2d. and further advances mortgage dated November 7, 1922) to bank; charged on Wennington House, Wennington. *£36,231 5s. 3d. October 17, 1923.

PARKER FOUNDRY CO., LTD., Derby. Registered March 10, £15,000 debentures dated January 29, 1924; general charge. *£15,000. February 29, 1924.

SMITH AND COVENTRY, LTD., Salford, ironfounders. Registered February 26, £2,000 second debentures, part of £25,000; charged on properties at Salford, etc.; also general charge. *£100,000 first debentures. August 31, 1922.

Satisfaction

PARTINGTON STEEL AND IRON CO., LTD., Irlam. Satisfaction registered March 18, £106,496, etc., registered July 20, 1911, and February 15, 1912.

Partnership Dissolved

OVERTHROW AND SANDERS (William Frank OVERTHROW and Percy Harold SANDERS), metallurgists and analytical chemists, Cotteridge, Kings Norton, in the county of Worcester, as from March 24, 1924, by mutual consent. Debts received and paid by P. H. Sanders, who will continue the business.

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From Week to Week

SIR ALFRED AND LADY MOND are expected to arrive in London from India on April 14.

SIR HENRY DENNIS READETT-BAYLEY of Nottingham, managing director of the Digby Colliery Co., Ltd., has joined the board of Low Temperature Carbonisation, Ltd.

ALLEN, CRAIG AND CO. (LONDON), LTD., announce that they have removed their offices from 43-45, Great Tower Street, E.C., to Imperial House, 15, 17, 19, Kingsway, W.C.2, as from March 29.

ROPEWAYS, LTD., announce that from March 22 their London offices will be at Aldwych House, Aldwych, London, W.C.2. Their new telephone number is " City 4723," and their telegraphic address " Ropeways London."

A CHANGE OF ADDRESS is announced by Ernest Scott and Co., Ltd., and their associated company, George Scott and Son (London), Ltd., from Kingsway, London, to their engineering works at Bradfield Road, Silvertown, London, E.16.

THE ALUNITE CHEMICAL CORPORATION, LTD., operating alunite deposits on the west coast of Vancouver Island, is reported to have received an order from Australia for 30,000 tons of alunite fertiliser. The plant is being operated to turn out 100 tons per day.

WITH THE RE-OPENING of the galleries of the Science Museum at South Kensington, London, a series of lectures on the exhibits is being arranged. The two first of these were given on Tuesday on the Steam Engine, and the Modern Warship by Captain Edgar C. Smith.

THE NEW experimental coal gas plant, presented to Leeds University by Mr. Henry Woodall, jun., in memory of his father, the late Sir Corbet Woodall, was opened on Wednesday, March 26. The plant, which is provided with both horizontal and vertical retorts, cost nearly £4,000.

A FIRE CAUSING DAMAGE estimated at £500 broke out in the fire-lighter factory of Brown Brothers, Lochend Street, Motherwell, on Monday. The fire originated in the creosote tank shed, where a gas flame ignited the material, and in a few minutes the shed and main building were ablaze.

A FIRE OCCURRED at Dorman Long and Co.'s Newport Ironworks, Middlesbrough, on Wednesday. A spark from a passing locomotive fell on a truck of naphthene, which immediately burst into flame, and ignited two adjoining trucks. The amount of damage done, however, was not serious.

THE NUMBER OF PERSONS on March 24, 1924, recorded on the registers of employment exchanges in Great Britain was 1,063,500. This was 30,611 less than on March 17, 1924, and 222,123 less than on December 31, 1923. The total includes 786,600 men, 32,400 boys, 212,000 women, and 32,500 girls.

AN EXPLOSION OCCURRED at the Curlew Oxygen Acetylene Works, Jarrow, on Friday, March 28, in an air-compressor house, and Percy Toward, engineer, Newcastle, and Alan McCallum, engine attendant, Jarrow, were injured and conveyed to hospital. The compressor house and machinery were damaged.

AT A MEETING of the Birmingham Section of the Institution of the Rubber Industry on Friday, March 28, Dr. Philip Schidrowitz lectured on " The Physical Testing of Rubber and Its Relation to Factory Procedure." The meeting was presided over by Dr. W. Makower, of the Dunlop Rubber Co., and there was an interesting discussion.

THE WORK of the Disposals Board was formally brought to an end on Monday, when a dinner was given at Claridges Hotel, London. Among other speakers was the Chancellor of the Exchequer, Mr. Philip Snowden, who referred to the revenue brought in by the work of the commission which had amounted to 700 to 800 million pounds in all.

THE COUNCIL of the Manchester University have received £507 to be invested and known as the " Professor Harold Baily Dixon Bursary Fund." The income of this fund, which will be administered by a committee appointed by the Council, will be used to assist students in the Department of Chemistry who may be in need of financial assistance in order to complete their degree courses.

A SUM of £55,000 has been allocated by the directors of Reckitt and Sons, Hull, out of last year's profits, for distribution among the employees. This represents " Prosperity Bonus," and it will be divided among 6,000 workpeople. The firm is also proceeding with the erection of forty houses to deal with the immediate necessities of employees requiring adequate accommodation.

THE BOROUGH POLYTECHNIC INSTITUTE, LONDON, held its annual exhibition of students' work on Saturday, March 29, and large numbers of those interested in the work and of Borough residents generally attended. In every department exhibits were shown, and the laboratories, with scientific experiments in progress, were open to the visitors, while demonstrations took place in the welding, casting and electrical workshops.

THE SECRETARY FOR SCOTLAND, Mr. William Adamson, received a deputation on Tuesday, urging that Government action should be taken against the spreading habit of drinking methylated spirits. Mr. Adamson, replying to the deputation, said that after May 1 a material would be inserted in all methylated spirit, except that used for furniture polish, that would make it absolutely undrinkable and yet not destroy its usefulness.

DR. SIEGMUND GABRIEL, for many years professor of organic chemistry at the Chemical Institute of the University of Berlin, died on March 22 at the age of 72. Dr. Gabriel first studied under Bunsen at Heidelberg, but then passed to Berlin, where he became professor in course of time, and retired in 1921. He did considerable work on the synthesis of organic compounds, particularly the phthalic acid derivatives, and cyclic nitrogen compounds.

MR. WILLIAM CULLEN, M.I.M.M., who recently joined the board of Allen, Craig and Co., will be warmly congratulated on the conferment on him by the University of the Witwatersrand, South Africa, of the honorary degree of Doctor of Laws (LL.D.). The honour, it is understood, has been granted in recognition of Mr. Cullen's work for over twenty years in the field of education. General Smuts was the first honorary LL.D. of this university and Mr. Cullen has the distinction of becoming the second.

SPEAKING at a meeting of the Manchester Literary and Philosophical Society on Tuesday, Dr. A. E. Oxley said that it was only within the last two or three years that the physicist had had a chance to say anything about textiles, the chemist hitherto having possession of the field. The difficulty about cotton fibres was that they were so variable, in length, convolution and diameters. Physics was an exact science, and exact investigation of these factors was already yielding results of value at the Shirley Institute, Didsbury.

THERE HAS JUST BEEN COMPLETED in the Dominion Water Power Branch, Department of the Interior, Ottawa, an interesting analysis of the water power resources of Canada, developed and undeveloped, as at February 1, 1924. It includes special sections dealing with current progress in development, utilisation of developed water power and on the use of water power in the pulp and paper and central electric station industries, together with much other data of general interest. Copies of the bulletin may be obtained free of on application to the High Commissioner for Canada, Kinnaird House, Pall Mall, East, London, or to the Director of Water Power, Ottowa, Canada.

MR. G. E. FOXWELL, M.Sc., is leaving Sheffield to take up an important research appointment with the Gas Light and Coke Co. of London, as chief assistant research chemist. Mr. Foxwell is well known in the by-product coking industry and is chief chemist to the Koppers Coke Oven Co., Ltd. In March, 1923, he was awarded the 1916 Bronze Medal of the International Metallurgical and Chemical Society, an award open to the whole world for the best thesis, invention or discovery dealing with any chemical, metallurgical or allied subject. The medal was given to Mr. Foxwell for his mathematical theory of the path of travel of the gases in the coke oven, together with his work on ammonia.

THE DEATH took place on Friday, March 28, at his residence, Sutton Coldfield, of Mr. Alexander Edwin Tucker, F.I.C., aged 70. He had practised in Birmingham for 40 years, mainly in metallurgical research and analysis. He was a Fellow of the Institute of Chemistry, a Fellow of the Chemical Society, a member of the Birmingham Metallurgical Society, and a member of the Birmingham and Midland section of the Society of Chemical Industry. He served on the Committee of the last body, and was a former chairman. Mr. Tucker held the office of official analyst to the London Metal Exchange. He frequently read papers before scientific societies; his last contribution in Birmingham was on metal colouring.

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Abstracts of Complete Specifications

211,912. DYEING. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 26, Jarrestrasse, Hamburg, Germany. Application date, October 24, 1922.

The process is for dyeing animal, vegetable, or artificial fibres by means of mineral pigments. The substance is impregnated with solutions which yield the colour in the presence of a protective colloid, and the pigment is then coagulated and fixed on the fibre. In an example, cotton is impregnated with a 1–3 per cent. solution of ferric chloride containing 1–3 per cent. of glycerine or sugar as a protective colloid. The cotton is then treated with ammonia vapour in a closed vessel, which produces a white precipitate. The cotton is then treated with water containing 0·1–0·5 per cent. of hydrogen peroxide, and is then dried at 80°–100° C., which yields a red dye on the fibre. The pigment may also be formed by other alkalis in very dilute solution in the presence of a protective colloid—*e.g.*, a salt of lysalbinic acid. Other coagulating agents may be used such as sulphuretted hydrogen, carbon dioxide, thiocyanic acid, potassium ferrocyanide or ferricyanide, chromates, etc. Dyeing may also be effected with compounds of zinc, cadmium, cobalt, nickel, lead, antimony, tin, manganese, and chromium. A large number of substances are available for use as protective colloids, and in some cases the colloid may have dyeing properties. Other examples of the dyeing of artificial silk and wool by this process are given.

211,946. ELECTROLYSERS. J. P. Scott, 2, Lonsdale Road, Toronto, Canada. Application date, November 28, 1922.

This electrolytic apparatus is suitable for use in cases in which large volumes of gas are generated rapidly. The cells have separate anode and cathode compartments, and separate gas collecting chambers. The anolyte and catholyte are circulated through the apparatus, and each cell is provided with a number of inlet and outlet pipes which are connected to common mains. The pipes connecting the cathode compartments with the main have a greater capacity than the pipes connecting the anode compartments with their main. The separating chamber for the cathode gases is materially larger than the separating chamber for the anode gases. The conduits for connecting the anodes and cathode compartments to the gas separating chambers above the level of the liquid are of such size that the electrolyte is conveyed through them by the evolved gas.

212,029 and 212,030. NEW AZO DYESTUFFS, MANUFACTURE OF. A. G. Green, K. H. Saunders, and G. H. Frank, of Crumpsall Vale Chemical Works, Blackley, Manchester, and British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester. Application date, January 13, 1923, and January 15, 1923.

212,029. Azo compounds containing the dialkyl-omega-sulphonic acid group, $NR.R^1SO_3H$ in which R is an alkyl group and R^1 is the residue of an alkyl group, are obtained by coupling disazo compounds with omega-sulphonic acids derived from secondary amines. The latter are obtained by the action of sodium formaldehyde bisulphite on mono-methylaniline, mono-ethylaniline, etc. Disazo compounds of this type are obtained by employing in the process tetrazo compounds derived from paradiamines. Those azo compounds which contain a nitro group in the benzene nucleus in the para position to the azo group may be reduced by means of sodium sulphide to obtain amido-azo compounds having a free amido group in addition to the alkyl-amido-omega-sulphonic acid group. The dyestuffs which contain no other sulphonic group besides that derived from the aldehyde bisulphite are suitable for dyeing acetate silk. Several examples of these dyes are given.

212,030. Specification 197,809 (see THE CHEMICAL AGE, Vol. VIII., p. 676) describes the preparation of a series of methyl-omega-sulphonic acids derived from diamido-azo compounds. These acids are of the general formulæ :—

$$X.N_2.Y.NH.CH_2SO_3H \text{ and}$$
$$X.N_2.Y.N_2Z.NH.CH_2SO_3H$$

in which the hydrocarbon residue **X** contains a primary amido group in the para position to the azo group. The azo colouring matters of the present invention are of the types :—

$$\begin{matrix} & N_2.Y.NH.CH_2.SO_3H \\ X'' & \\ & N_2P \end{matrix}$$

and

$$\begin{matrix} & N_2.Y.N_2Z.NH.CH_2.SO_3H \\ X'' & \\ & N_2P \end{matrix}$$

in which P is a phenol, carboxy-phenol, amido-phenol, naphthol, amido-naphthol, dihydroxy-naphthalene, meta-diamine or sulphonic acid of these. It is found that the amido group of the sulphonic acids of the above mentioned type may be diazonitised by treatment with nitrous acid without any action on the methyl-omega-sulphonic group. The diazo compound thus obtained may be coupled with the usual components, the methyl-omega-sulphonic group still remaining intact. Those dyestuffs which contain no sulphonic group except that derived from the formaldehyde bisulphite are suitable for dyeing acetate silk, while others containing sulphonic groups attached to the benzene or naphthalene nucleus may be used for dyeing animal fibres.

212,034–5. CATALYTIC AGENTS, MANUFACTURE OF. W. A. Patrick, The Terraces, Mount Washington, Baltimore, Md. U.S.A. Application date, January 17, 1923.

212,034. These catalytic agents are supported on gels such as silica gel as a carrier. Silica gel has ultra microscopic pores, and has a structure such that it contains about 21 per cent. of water when it is in equilibrium with water vapour at 30° C., and a partial pressure of 22 mm. of mercury. In this invention, the hydrogel obtained at an intermediate stage of manufacture, which contains 90 per cent. of water is treated with a dilute alkali which is selectively adsorbed by it. Silicic acid hydrogel is capable of adsorbing considerable quantities of alkali hydroxide, but not of acids or salts. The hydrogel is then immersed in a dilute solution of a salt such as ferric nitrate, and is washed and dried. The iron is finally in the state of ferric oxide or hydroxide, depending on the temperature to which it has been heated. The catalyst thus obtained is much more active than other catalysts, and an iron catalyst obtained as above gives 90 per cent. conversion of SO_2 to SO_3 in a 7 per cent. mixture of sulphur dioxide and air. The process may also be applied to other catalysts, such as oxides of aluminium, copper, manganese, silver, magnesium, nickel, and calcium, and other gels similar to silica gel may be used, such as gels of tungstic oxide, stannic oxide, etc. In all cases the concentration of the sodium hydroxide solution is only about 0·005 N to 0·05 N, while the catalyst salt has a concentration of about 0·1 molar.

212,035. The process described in Specification No. 212,034 above is applied to the production of a catalyst which is particularly suitable for gaseous reactions. The catalyst which is supported on silica gel has the maximum surface per unit weight, and the process is therefore particularly applicable to expensive catalysts such as platinum. The gel is first treated with water so that its pores become filled with water, and is then treated with a colloidal solution of the metal or metal oxide which it is required to deposit. It is found that the particles of the colloid do not penetrate far into the gel, but are held in the pores at or near the exterior surface, so that the maximum surface of catalyst is obtained. In an example, a colloidal solution of platinum is obtained by reducing chlor-platinic acid by formaldehyde, and this is absorbed by silica gel, which is then dried. The gel then contains about 15 per cent. of moisture and 0·01 per cent. of platinum. This catalyst is capable of giving a 90 per cent. conversion of SO_2 to SO_3.

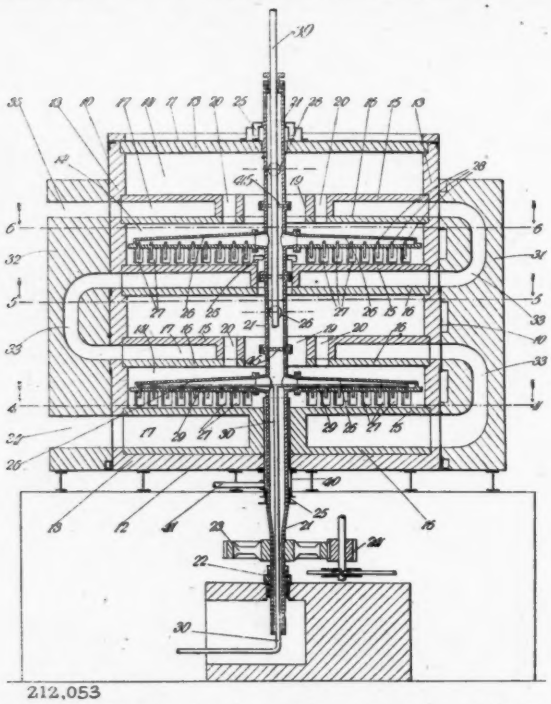
212,045. METAL SULPHIDES, PROCESS OF MAKING. H. Howard and E. B. Alvord, 1,300, Guardian Buildings, Cleveland, Ohio, U.S.A. Application date, January 29, 1923.

The process is for making metal sulphides by reduction of the sulphates with carbon. It is found that if the metal sulphate is very finely divided and is reduced to sulphide when in sus-

pension in a reducing atmosphere, the reaction takes place with great rapidity and efficiency. When applied to the treatment of barium sulphate, the material is ground to 200 mesh screen and is then mixed with pulverised coal. The mixture is blown into a combustion chamber by means of air and burned, and the barium sulphide is then separated from the gases by electrostatic precipitators, cyclone dust separators, bag filters, or scrubbing liquids. Alternatively, the barium sulphate may be mixed with a combustible gaseous mixture, and blown into a combustion chamber in which the gas is ignited to produce the necessary heat and reducing conditions. In another alternative, the sulphate may be blown into a combustion chamber into the flame produced by burning liquid fuel such as oil. The minimum temperature for reduction is about 950° C. for barium sulphate, but is lower for sodium sulphate. The hot reducing gases after separation of the metal sulphide may be employed as fuel.

212,053. Low or Medium Temperature Distillation of Oil Shale, Bituminous Coal or the Like. T. R. Starkey, Malvern, Natal, South Africa. Application date, February 2, 1923.

In this apparatus the material may be subjected to distillation in the presence of steam, oil vapour, or other gas. A vertical cylinder 10 is closed by covers 11, 12, and is divided



212,053

into four similar chambers 14. The horizontal partitions are arranged in pairs 15, 16, which enclose a conduit 17 between two adjacent chambers 14. The uppermost pair of partitions 15, 16 are provided with central openings 19 and adjacent passages 20 connecting the two uppermost chambers 14, and the next pair of partitions 15, 16, are provided with transverse conduits (not shown), arranged around the periphery, connecting the two adjacent chambers 14. The remaining partitions 15, 16 are similarly provided with central openings. A hollow vertical shaft 21 is rotated by gearing 23, 24, and extends through a water seal 25. The shaft carries a pair of hollow radial rabble arms in each chamber 14 carrying depending rabbles 27. Each rabble arm carries a series of outlet pipes 28.

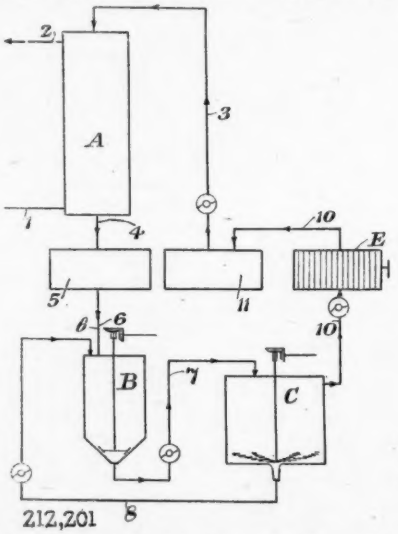
Flues 33 are arranged in two refractory structures 31, 32, on opposite sides of the casing 10, so that hot gases entering by an inlet 34 are conducted through the conduit 17 to the outlet 35 in a tortuous path as shown. Oil shale or bituminous coal is fed to the upper chamber 14, and is gradually transferred by the rabbles to the central apertures, and thence to the next chamber 14, through which it passes radially outwards to the peripheral openings, and so on. The distillation vapours may be withdrawn from each chamber 14 separately, or through a single outlet at the top. Steam, oil vapour, or other gas may be introduced through the pipes 30, 39 to the rabble arms, and thence to any or all of the chambers 14. Water may also be circulated through the rabble arms in this manner. The various products are evolved at the lowest possible temperature, and are immediately removed by the injected gases so that overheating is avoided.

212,065. Gels, Manufacture of. The Silica Gel Corporation, 239, Redwood Street, Baltimore, Md., U.S.A., and W. A. Patrick, The Terraces, Mount Washington, Baltimore, Md., U.S.A. Application date, February 9, 1923.

This process for preparing gels of oxides of tin, aluminium, tungsten, and titanium, is an improvement on that described in Specification No. 136,543 (see The Chemical Age, Vol II, p. 210). The concentrations are first determined of an acid and a solution of a sodium salt of one of the oxides mentioned above, such that when mixed no precipitate is produced, but the liquid sets to a hydrogel without dialysis within 4-5 hours after mixing. To prevent precipitation it is necessary to stir the solutions vigorously at the moment of mixing. The amount of salt solution and acid solution used are such as to give a final concentration of the H ions coming from the acid in the mixture varying between 1/10th and 5/10th mols per litre. The salt solution should have a concentration of 3–8 per cent. The salt solution may be added slowly to the acid solution, or preferably both solutions are run together continuously at such a rate that the desired excess of acid is obtained. The mixture is allowed to set to a hydrogel, which is then broken up and washed and dried slowly. The hydrogel is first dried in air at 75°–120° C. for 4 to 8 hours, and finally in air at 300°–400° C., or alternatively under vacuum at a lower temperature. The process may be applied to a mixture of the oxides referred to above which yields a mixture of gels.

212,201. Gases, Purification of. The Koppers Co., 800, Union Arcade Building, Pittsburg, Pa., U.S.A. Application date, November 27, 1922. Addition to 190,131. (See The Chemical Age, Vol. VIII, p. 182.)

The process is for purifying gases such as coke oven gas from hydrogen sulphide, hydrocyanic acid, etc. These impurities are absorbed in sodium carbonate solution, which is then regenerated by treatment with a suspension of iron oxide



212,201

which absorbs the sulphur. The gas passes upwards through a scrubber A, and the sodium carbonate solution of 1–5 per cent. strength enters at the top by the pipe 3 and passes out at the bottom by a pipe 4 to a tank 5. The solution containing sulphides is then agitated with a 2–3 per cent. suspension of iron oxide in a vessel B, and the mixture is then pumped through a pipe 7 to a Dorr thickener C, where the iron sulphide is separated. The regenerated solution is filtered in a filter press E, and then passes to a tank 11 for return to the scrubber A. The sludge may be returned from the apparatus C to the agitator B until exhausted, and may then be discarded or regenerated. The process is continuous.

212,145. NEW VAT COLOURING MATTERS, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, April 18, 1923.

It is known that dibenzanthrone obtained by the alkaline condensation of benzanthrone may be treated with halogens to obtain colouring matters. It is now found that halogen derivatives of dibenzanthrone colouring matters may be obtained in a new form by chlorinating the dibenzanthrone colouring matters in a chlorsulphonic acid medium. In an example, a solution of dibenzanthrone in chlorsulphonic acid is treated with chlorine at 0°–10° C., until the dyestuff left behind from a test portion of the mixture on diluting with water and filtering is soluble in alkaline hydrosulphite solution with a greenish blue colour. The dyestuff obtained dyes cotton violet shades with a reddish tinge not obtainable with known dibenzanthrone colouring matters.

NOTE.—Abstracts of the following Specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—188,651 (Nitrogen Corporation) relating to an ammonia synthesis autoclave, see Vol. VIII, p. 69; 190,131 (Koppers Co.) relating to purification of gases, see Vol. VIII, p. 182; 197,966 (Oderberger Chemische Werke Akt.-Ges.) relating to colloidal solutions and reversible dried residues, see Vol. IX, p. 129; 202,630 and 202,632 (Durand and Huguenin Akt.-Ges.) relating to products for dyeing and printing textile fibres, see Vol. IX, p. 465; 205,477 (Norsk Hydro-Elektrisk Kvaelstofaktieselskab) relating to synthesis of ammonia, see Vol. IX, p. 667; 202,660 (E. Layrand) relating to salts of C.C.-disubstituted barbituric acids, see Vol. IX, p. 465; 206,134 (H. Pereira) relating to manufacture of 3:10-perylene quinone, see Vol. X, p. 18.

International Specifications not yet Accepted

210,413. ANTHRACENE DERIVATIVES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, January 24, 1923.

A 2-mercapto-anthraquinone-3-carboxylic acid is condensed with a mono-halogen-acetic acid, or a 2-halogen-anthraquinone-3-carboxylic acid with thioglycollic acid to obtain anthraquinone-2-thioglycol-3-carboxylic acids. These may be reduced by zinc dust and aqueous ammonia to anthracene-2-thioglycol-3-carboxylic acid. The 2-mercapto-anthraquinone-3-carboxylic acid referred to may be obtained by treating 2-chlor-anthraquinone-3-carboxylic acid with sodium hydrosulphide.

These anthracene and anthraquinone thioglycol-carboxylic acids may react with the usual indigoid dye components such as isatins, thioisatins, isatin anilides or chlorides, acenaphthene-quinones or naphthoquinones to yield vat dyestuffs. These products may also be obtained by converting the thioglycol-carboxylic acids into the corresponding anthracene or anthraquinone oxythionaphthenes, and then condensing with indigoid dye components. The oxythionaphthenes may be oxidised to the thioindigos. These products may also be obtained by condensing a 2-hologen-anthraquinone-3-carboxylic acid with thioglycollic acid, or 2 mercapto-anthraquinone-3-carboxylic acid with a dihalogen-ethylene, and treating the ethylene-bis-2:3-thioanthraquinone-carboxylic acid with chlorsulphonic acid. A number of examples of these dyestuffs are given.

210,432. DEHYDRATING ALCOHOL. P. Verola, 9, Avenue de Madrid, Neuilly-sur-Seine, France, C. Baron, 37, Rue Michelet, Asnieres, Seine, France, A. Verley, 86bis, Avenue Victor Hugo, Neuilly-sur-Seine, France, and E. Urbain, 30, Avenue de l'Observatoire, Paris. International Convention date, January 23, 1923.

Alcohol is dehydrated by means of potassium acetate and a substance—such as higher or cyclic alcohols, phenol, cresol, or an ester such as lactic ester—which is soluble in alcohol and in potassium acetate and causes the latter to swell on drying. Such a mixture may be distilled at 92° C. until half the alcohol is obtained; the remainder is removed and the residue dehydrated by distilling in vacuo, or at 95° C., and then drying in vacuo.

210,434. ALKALI SULPHIDES. Soc. Nationale d'Industrie Chimique en Belgique Soc. Anon., Rue Joseph Dupont, Brussels. International Convention date, January 23, 1923.

An alkali metal salt such as sodium nitrate is treated with barium sulphide and water in a reducing atmosphere, *e.g.*, sulphuretted hydrogen at a temperature of 10°—200° C. and pressure of one atmosphere. Sodium hydrosulphide and barium nitrate are obtained, and are separated by crystallisation. The hydrosulphide may then be converted into sulphide. Alternatively, a mixture of sodium metasilicate, barium or calcium sulphite, and charcoal is heated to 350°—1,500° C., at a pressure of 25 cm. of water, in a reducing atmosphere of hydrogen, carbon monoxide, saturated or unsaturated hydrocarbons, and the product is leached with water.

LATEST NOTIFICATIONS.

213,250. Process for the manufacture of d. l-nerolidol. Naef and Co., M. March 22, 1923.

213,251. Process for the manufacture of farnesol. Naef and Co., M. March 22, 1923.

213,266. Dyeing Wool. Farbwerke vorm. Meister, Lucius, and Brüning. March 19, 1923.

213,285. Process of the manufacture of soluble antimony compounds. Chemische Fabrik von Heyden. March 23, 1923.

Specifications Accepted, with Date of Application

190,723. Liquid or liquefiable hydrocarbons, installations and devices for the distillation and de-polymerisation of. A. A. F. M. Seigle. December 22, 1921.

198,676. Highly chlorinated hydro-aromatic products containing nitrogen, Manufacture of. Durand and Huguenin Akt.-Ges. May 31, 1922. Addition to 193,843.

201,539. Manganese steels, Process in the manufacture of. Soc. Anon. des Hauts Fourneaux, Forges, et Aciéries de Pompey. July 31, 1922.

207,547. Adsorption media, Process for re-activating—with the simultaneous recovery of the adsorbed products by means of electrically generated heat. Naamlooze Venootschap Montaan Metaalhandel. November 23, 1922.

209,706. Diethyl-chloracetamide, Process for the preparation of. Soc. Chimique des Usines du Rhône. January 10, 1923.

212,500. Hydrocarbons, especially cracked spirit, Treatment of. F. G. P. Remfry. May 22, 1923.

212,585. Annular muffle furnaces or ovens. Woodall, Duckham and Jones (1920), Ltd., and Sir A. M. Duckham. Sept. 5, 1922.

212,598. Concentrators for ores or other materials. G. C. E. Keet. Oct. 17, 1922.

212,642. Emulsifying apparatus. A. Sonsthagen, J. L. Wood, and Keenok Co., Ltd. December 14, 1922.

212,768. Sulphuric acid, Process and apparatus for the manufacture of. Sulfur Akt.-Ges. and W. Franck. April 13, 1923.

212,770. Fractional distillation of oils from oil shale or similar material, Apparatus for. D. K. Fairweather. (*R. H. Crozier.*) April 18, 1923.

212,818. Tars and gases from bitumen containing materials, Method of extracting. M. Klotzer. July 24, 1923.

Applications for Patents

Babcock and Wilcox, Ltd., and Lulofs, W. Pulverised-fuel furnaces. 7,415. March 24.

Coley, H. E. Reduction of carbonates or bicarbonates. 7,427 March 24.

Coley, H. E. Reduction of sulphates. 7,428. March 24.

Cutter, J. O., Drew, R. B., and Duncalf, R. Process for manufacture of active absorbing carbon and phosphoric acid and its compounds. 8,048. March 29.

Ditmar, R. Manufacture of cellulose-caoutchouc products. 7,845. March 27. (Austria, April 9, 1923.)

Francesconi, L., and Gaslini, M. Refining fats and oils. 7,967. March 28. (Italy, November 26, 1923.)

Henkel et Cie., Ges. Manufacture of mouldings of solid soluble alkali silicates. 7,875. March 27. (Germany, May 2, 1923.)

Kassner, G. Manufacture of nitric acid, etc. 7,484. March 24. (Germany, March 31, 1923.)

Metallbank und Metallurgische Ges. Akt.-Ges. Alloys and metals. 7,519. March 24. (Germany, March 31, 1923.)

Meyerhofer, A. F. Process of producing inorganic acids. 7,862. March 27. (Germany, March 28, 1923.)

National Benzole Association and Williams, E. C. Application of adsorbent materials. 7,811. March 27. (February 23, 1923.)

Ramage, A. S. Low-temperature distillation. 7,483. March 24. (United States, April 9, 1923.)

Soc. Française des Glycérines. Production of a decolorising and deodorant black composition. 7,866. March 27. (France, May 1, 1923.)

Soc. of Chemical Industry in Basle. Manufacture of indigoid dyestuffs. 7,622. March 25. (Switzerland, July 18, 1923.)

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, April 3, 1924.

BUSINESS remains quiet, and there has been no special feature during the past week. The marked improvement, however, in some of the Continental exchanges has already begun to have its effect upon prices, some of which show a distinct upward tendency.

Export inquiry has been very slow.

General Chemicals

ACETONE is in fair demand at recent values.

ACID ACETIC is lower in price. The fall seems to be due to realisations by weak holders rather than to any intrinsic decline in value.

ACID CITRIC is unchanged.

ACID FORMIC remains scarce and the small parcels which arrive are eagerly snapped up.

ACID LACTIC is unchanged.

ACID OXALIC has been in fair inquiry, price unchanged.

ACID TARTARIC is firmer. The upward trend of Continental exchanges seems likely to cause a further advance in price.

BARIUM CHLORIDE is unchanged.

BLEACHING POWDER is unchanged.

CREAM OF TARTAR is in active demand, and price tends upwards.

FORMALDEHYDE is a firm market, higher prices are expected.

LEAD ACETATE.—Rather weaker in sympathy with the metal.

METHYL ALCOHOL is scarce and advancing.

POTASSIUM CAUSTIC AND CARBONATE is unchanged.

POTASSIUM PERMANGANATE is lower in price.

POTASSIUM PRUSSIATE.—Stocks are firmly held, although the demand is slow.

SODA ACETATE is very scarce, and a premium is paid for near delivery.

SODA BICHROMATE is fairly active—the price seems stable.

SODA NITRITE.—There is very little available for early delivery. Price is firm.

SODA PRUSSIATE is unchanged.

SODA SULPHIDE is weaker and the tendency is in buyers' favour.

Coal Tar Intermediates

There is no great change to report in the position of this market for the last week, although there has been more inquiry for export in one or two particular lines.

ALPHA NAPHTHOL is without special interest.

ALPHA NAPHTHYLAMINE has been of interest for export account, the price being unchanged.

ANILINE OIL AND SALT has been of moderate interest.

BENZIDINE BASE.—The usual business has been passing.

BETA NAPHTHOL has been of fair interest for both home and export markets.

DIMETHYLANILINE has been of slightly more interest, the price being unchanged.

DIPHENYLAMINE is quiet at last quoted figures.

"H" ACID.—A small volume of business has been placed.

NITRO BENZOL.—The regular home trade business has been passing, the price being firm.

PARANITRANILINE has been of interest for export account, and the price is steady.

"R" SALT has been of less interest than of late.

RESORCINE.—There is a fair demand for export markets.

XYLIDINE is without special interest.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID continues in demand. The French makers have advanced their quotations.

AMIDOL is firmer.

BROMIDES are steady at last prices.

EUCALYPTUS OIL is in buyers' favour.

HYDROQUINONE is in better demand and tends to harden.

MORPHIA.—Makers have reduced their quotations due to the lower price of opium.

MERCURIALS are firmly held, higher prices being quoted in most directions.

METOL has advanced and may go higher.

PHENACETIN is quiet, price being cut by dealers.

PHENAZONE is advancing.

SODA SALICYLATE.—Prices are well maintained.

VANILLIN is firm.

Coal Tar Products

Except for the fact that creosote is rather weaker, there is little change to report in the market for coal tar products.

90 PER CENT. BENZOL remains steady at 1s. 7d. per gallon on rails.

PURE BENZOL is also steady at 1s. 11d. per gallon rails.

CREOSOTE OIL is rather weaker at 7¾d. to 8d. per gallon on rails in the North, while the price in London remains firm at about 9d. to 9¼d. per gallon.

CRESYLIC ACID is perhaps a little firmer, the Pale quality 97/99 per cent. beng worth about 2s. 1d. to 2s. 2d. per gallon on rails, while the Dark quality 95/97 per cent. is quoted at about 1s. 9d. to 1s. 10d. per gallon.

SOLVENT NAPHTHA is unchanged at 1s. 2d. to 1s. 3d. per gallon.

HEAVY NAPHTHA is still quoted at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENE remains dull, there being no change in value to report. The low grade qualities are being quoted at £7 to £7 10s. per ton, 74/76 melting point at £8 to £8 10s. per ton, and 76/78 melting point at £9 to £9 10s. per ton.

PITCH—Little interest has been shown either by buyers or sellers. Prices are somewhat easier. To-day's quotations are:—62s. 6d. to 67s. 6d., f.o.b., London. 60s. to 65s. f.o.b., East and West Coast.

Sulphate of Ammonia

The position is unchanged, and prices are well maintained.

The Use of Phenol Resins

IN a recent paper before the American Chemical Society, Mr. L. W. Redman pointed out that the chemical and physical properties of the phenol resins made from phenol and active methylenes allows of extended and increasing use and adaptation of these phenol resins in the chemical and electrical industries. It is indirectly rather than directly that these resins find their widest applications. For example, certain types of electrical resistances demand that the insulations have no cold nor hot flow and that they do not change dimensions when under pressure and strain. The laminated phenol products are finding new fields in this direction, particularly the automatic telephone and wireless. New direct applications in the chemical industry are not many in number but we might mention the use of the laminated products for octagonal rotating drums in cyanide baths. Also chain conveyors made of these phenol products (laminated) are used in cyanide plating baths. Recently success has been obtained in the laminated products in their use for pump valve discs in the deep well oil fields and also in pumps handling organic liquids such as blood and slaughterhouse waste liquors.

Resistance to cold flow when under pressure, resistance to distortion, under heat, non-absorption of water in atmospheres at the dew point, light in weight (low specific gravity) and resistance to breakage under shock, are the chemical and physical properties which are allowing adaptation of phenol resins in the chemical, mechanical and electrical field. Their chemical value is really indirect. It is by virtue of their chemical inertness that their use is extended almost daily.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	105	0	0	to	107	10	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	51	0	0	to	53	0	0
Acetic, 40% pure	ton	26	0	0	to	27	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	7½	to	0	0	8
Citric	lb.	0	1	5¾	to	0	1	6
Formic, 85%	ton	65	0	0	to	68	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	45	0	0	to	47	0	0
Nitric, 80 Tw.	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5½	to	0	0	5¾
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	1½	to	0	1	2
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	7	10	0	to	8	10	0
Sulphate, 17–18%	ton	8	10	0	to	9	10	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	5	to	0	1	6
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	65	0	0	to	66	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	10	0	to	15	0	0
Nitrate	ton	37	0	0	to	40	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	80	0	0	to	85	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	65	0	0	to	66	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	49	10	0	to	50	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	50	0	0	to	51	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	0	0	to	4	5	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	9	0	0	to	10	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	85	0	0	to	86	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	9	to	0	0	9½
Prussiate, red	lb.	0	1	10	to	0	2	0
Prussiate, yellow	lb.	0	0	9½	to	0	0	10
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to		—	
Bisulphite, 60–62%	ton	20	0	0	to	22	0	0
Chlorate	lb.	0	0	2¾	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	29	0	0	to	30	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5¾	to	0	0	6
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	0	to	0	1	1
Tin perchloride, 33%	lb.	0	1	4	to	0	1	5
Perchloride, solid	lb.	0	1	5	to	0	1	6
Protochloride (tin crystals)	lb.	0	1	8	to	0	1	10
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	6	to	0	4	0
Acetanilid	lb.	0	2	10	to	0	3	0
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	9	to	0	3	0
Salicylic, B.P.	lb.	0	2	0	to	0	2	2
Tannic, leviss.	lb.	0	3	0	to	0	3	3
Amidol	lb.	0	8	6	to	0	9	0
Amidopyrin	lb.	0	13	9	to	0	14	3
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	16	0	to	0	16	6
Beta naphthol resublimed	lb.	0	3	0	to	0	3	6
Bromide of ammonia	lb.	0	0	10	to	0	1	0
Potash	lb.	0	0	8	to	0	0	8½
Soda	lb.	0	0	8½	to	0	0	9
Caffeine, pure	lb.	0	12	3	to	0	12	9
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	10	to	0	2	0
Calomel	lb.	0	3	6	to	0	3	9
Chloral hydrate	lb.	0	3	10	to	0	4	0
Cocaine alkaloid	oz.	1	1	0	to	1	2	6
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	3	0	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	0	to	0	2	2
B.P. (75–80% eucalyptol)	lb.	0	2	1	to	0	2	3
Guaiacol carbonate	lb.	0	12	9	to	0	13	0
Liquid	lb.	0	11	6	to	0	12	0
Pure crystals	lb.	0	12	6	to	0	13	0
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	4	6	to	0	5	0
Lanoline anhydrous	lb.	0	0	7	to	0	0	6
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	9	to	0	3	0
Metol	lb.	0	10	6	to	0	11	6
Milk sugar	cwt.	4	0	0	to	4	5	0
Paraldehyde	lb.	0	1	5	to	0	1	7
Phenacetin	lb.	0	6	9	to	0	7	0
Phenazone	lb.	0	7	9	to	0	8	3
Phenolphthalein	lb.	0	7	6	to	0	7	9
Potassium sulpho guaiacolate	lb.	0	6	3	to	0	6	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	0	to	0	6	0
Salicylate of soda powder	lb.	0	2	8	to	0	2	9
Crystals	lb.	0	2	9	to	0	3	0
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	3	to	0	3	6
Sulphonal	lb.	0	17	6	to	0	18	3
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	4	6	to	1	5	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9¼
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	4	to	0	4	7
Sulphate	lb.	0	3	4	to	0	3	7
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	10	to	0	0	11
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	4	6	to	0	4	9
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	6	to	0	2	8
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	dearer, c.i.f. 3/0 spot	0	2	9
Bay		0	10	6
Bergamot	dearer	0	17	0
Cajuput		0	3	3
Camphor, white	per cwt.	3	15	0
Brown	„	3	15	0
Cassia	c.i.f. 8/0 spot	0	8	6
Cedarwood		0	1	6
Citronella (Ceylon)	c.i.f. 3/3 spot	0	3	7
(Java)	c.i.f. 4/6 spot	0	4	9
Clove		0	8	6
Eucalyptus		0	2	3
Geranium Bourbon		1	10	0
Lavender		1	5	0
Lavender Spike		0	6	0
Lemon		0	3	3
Lemongrass	dearer per oz.	0	0	2½
Lime (distilled)	firm	0	4	9
Orange sweet (Sicilian)		0	13	0
(West Indian)		0	10	0
Palmarosa		0	18	0
Peppermint (American)	dearer	1	0	0
Mint (dementholised Japanese)		0	17	0
Patchouli		1	2	6
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	11
Sandalwood		1	5	0
Sassafras		0	10	6
Thyme	2/6 to	0	8	0

Synthetics.		£	s.	d.
Benzyl acetate	per lb.	0	3	6
Benzoate	„	0	3	6
Citral	„	0	10	0
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	2	6
Methyl salicylate	„	0	2	9
Musk xylol	„	1	0	0
Terpeniol	„	0	2	9

Chemical and Dyestuff Traders

London Dock and Warehouse Charges

In the current bulletin of the British Chemical and Dyestuffs Traders' Association, Ltd., members are reminded that the P.L.A. charges on imports and exports have been increased from 55 to 100 per cent. above the normal rates. This latest advance of 45 per cent. operates on and from April 1, 1924. At a meeting of trade and mercantile organisations at the London Chamber of Commerce the matter was fully discussed, and the following resolution, which the Association representative seconded, was passed without dissent: "That strong representations be made to the Port of London Authority against the very heavy increase in dues on shipping, cost of discharging, additional rent and other charges in the Port of London, and that the Port of London Authority be asked to receive a deputation, and meanwhile to postpone applying the additional charges until an opportunity has been given to discuss the matter. Failing agreement with the Port of London Authority this meeting determines to make appeal under the Act, to the Board of Trade, to hold an inquiry before the rates become operative." A copy of this resolution was forwarded to the Port Authority and a request that a deputation be received was made. A deputation of trade and mercantile organisations, on which the association will be represented, will meet the Port Authority.

As regards the German (Reparation Recovery) Act the 5 per cent. levy is in force up to April 15, and will probably continue for some little time after that date.

For some time past the Association have been appealing to the Board of Trade to allow a special discount to merchants purchasing reparation colours for resale. After some months of negotiations they have been advised that a special discount cannot be allowed, it being added "that the Board have no doubt that the Treasury, which is the department primarily concerned in this matter, would not sanction any scheme of the kind proposed." This matter is being taken up with the Treasury.

As the result of a recent meeting in Glasgow a number of important houses have already joined, and further good support has been promised. In due course it is hoped to form a Scottish branch in Glasgow.

The annual general meeting and luncheon take place on Thursday, May 15.

Post Graduate Courses in Chemistry

The London County Council Education Department, in drawing attention to the education facilities available for British subjects whose parents reside in London, point out that these include free places at the Imperial College of Science and Technology, South Kensington, for post-graduate courses in chemistry and other subjects.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 3, 1924.

BUSINESS in the heavy chemical market has shown some little improvement during the past week, inquiries both for export and home consumption being more numerous than during the preceding week.

Prices named in Continental quotations are in nearly all cases higher, and spot prices consequently are stiffening. Prices for home products remain on about the same level as last reported.

Industrial Chemicals

ACID ACETIC.—Unchanged. Glacial, 98/100%, £62 to £70 per ton, 80% pure, £51 to £53 per ton; 80% technical, £47 to £50 per ton, all packed in casks, delivered c.i.f. U.K. port, duty free. Moderate inquiry for export.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Rather better inquiry. Price now 8¼d. to 8¾d. per lb., carriage paid.

ACID CITRIC B.P. CRYSTALS.—Unchanged at about 1s. 5d. to 1s. 5½d. per lb., less 5%, carriage paid.

ACID FORMIC 85%.—Some cheap spot parcels on offer. Quoted £63 to £65 per ton, ex store. Offered for forward delivery at £62 per ton, c.i.f. U.K. port.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Spot material unchanged at about 5½d. per lb. Offered early delivery at about 5d. per lb., c.i.f. U.K. port.

ACID SULPHURIC.—114°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 1s. 1½d. per lb., less 5% ex store.

ALUMINA Sulphate, 17/18% iron free.—Offered from the Continent at £7 12s. 6d. per ton c.i.f. U.K. port. Spot lots quoted £8 10s. per ton ex store.

ALUM CHROME.—Potash chrome alum quoted about £27 per ton, ex station. Ammonium chrome alum about £20 to £21 per ton, ex store. Moderate inquiry for export.

ALUM POTASH (LUMP).—Spot lots quoted £10 15s. per ton, ex store. Offered from the Continent at about £9 12s. 6d. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5½d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K.

AMMONIA LIQUID 880°.—Unchanged at 2½d. to 3d. per lb., delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Grey galvanisers quality on offer at £30 per ton, ex station or delivered, f.o.b. U.K. port. Fine white crystals offered from the Continent at about £25 15s. per ton, c.i.f. U.K. port.

AMMONIA SULPHATE.—25¼%, £13 12s. per ton; 25¾% quality, £14 15s. per ton, ex works, prompt delivery.

ARSENIC, WHITE POWDERED.—Spot lots now quoted £67 5s. per ton, ex store. Offered for early delivery at about £65 per ton, ex wharf.

BARIUM CARBONATE 98/100%.—Offered from the Continent at £11 10s. per ton, c.i.f. U.K. port, prompt shipment.

BARIUM CHLORIDE 98/100%.—English material unchanged at about £14 5s. per ton, ex store. Continental quoted £13 5s. per ton, c.i.f. U.K. port.

BARYTES.—Finest English white quoted £5 5s. per ton, ex works. Continental about £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Continental on offer at £4 15s. per ton, c.i.f. U.K. port.

COPPERAS GREEN.—Quoted £3 5s. per ton, f.o.b. U.K. port, packed in casks.

COPPER SULPHATE.—Moderate inquiry quoted £25 per ton, ex store. Spot lots of Continental material on offer at slightly less.

FORMALDEHYDE 40%.—Unchanged at £62 to £63 per ton, ex store, spot delivery, in little demand.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at £3 2s. 6d. per ton, c.i.f. U.K. port.

LEAD, RED.—Continental material unchanged at about £42 per ton, ex store, spot delivery.

LEAD, WHITE.—Continental make now quoted £43 per ton, ex store, spot delivery.

LEAD ACETATE.—Good inquiry and prices inclined to be higher. White crystals quoted £48 10s. per ton, ex store; brown about £46 10s. per ton, ex store. White crystals offered from the Continent at about £46 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Offered from the Continent at £3 5s. per ton, c.i.f. U.K. port. Spot material now quoted £3 17s. 6d. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality quoted £5 per ton ex store; B.P., £6 5s. per ton, ex station, prompt delivery.

POTASH CAUSTIC 88/92%.—Quoted £31 per ton ex wharf, early delivery. Spot lots about £32 10s. to £33 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE.—Continental prices higher; 96/98% quality quoted £24 10s. per ton, c.i.f. U.K. port; spot lots, £27 10s. per ton ex store; 90/94%, quality £22 10s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Little inquiry. Offered at 3¼d. per lb. ex store, spot delivery.

POTASSIUM NITRATE (Saltpetre).—Continental prices unchanged at about £26 5s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots quoted £31 per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Unchanged at about 9d. per lb., ex store, spot delivery.

POTASSIUM PRUSSIATE (YELLOW).—Unchanged at about 8¾d. per lb., f.o.b. U.K. port, or ex station, in little demand.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station, spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Spot lots unchanged at about £24 5s. per ton, ex store. Offered from the Continent at £22 10s. per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English makers' price unchanged at 4½d. per lb. D/d.

SODIUM CARBONATE.—Soda Crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material, £10 per ton, ex station; Continental, about £9 12s. 6d. per ton, c.i.f. U.K. port; pea crystals of English manufacture on offer at £14 10s. per ton, ex station.

SODIUM NITRATE.—Refined 96/98% quality, unchanged at £13 10s. to £13 15s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE 100%.—Quoted £27 to £28 per ton according to quantity f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Offered for spot delivery at 5d. per lb., ex store. Continental material quoted 4¾d. per lb., c.i.f. U.K. port, prompt shipment.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption, £4 5s. per ton, carriage paid stations. Good export inquiry.

SODIUM SULPHIDE.—60/65% solid, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62% offered from the Continent at £13 7s. 6d. per ton, c.i.f. U.K. port; broken, £1 per ton more; 31/34% crystals, English make, £9 2s. 6d. per ton ex station; 30/32% crystals Continental make, £9 per ton c.i.f. U.K. port.

SULPHUR, Flowers, £10 per ton; Roll, £9 per ton; Rock, £9 per ton; Ground, £8 per ton; prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 3d. per lb., f.o.b. U.K. port.

ZINC CHLORIDE 98/100%.—Moderate inquiry for export. Now quoted £26 per ton, f.o.b. U.K. port

ZINC SULPHATE.—English material quoted £13 10s. per ton, ex store. Offered from the Continent at £12 per ton, c.i.f. U.K. port.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANILINE SALT.—Good export inquiry. Price 8d. lb., f.o.b.

BETA NAPHTHYLAMINE.—Small export inquiry. Price 4s. 3d. lb., f.o.b.

DIPHENYLAMINE.—Export inquiry. Price 3s. 3d. lb., f.o.b.

META TOLUYLENE DIAMINE.—Export inquiry. Price 4s. 6d. lb., f.o.b.

PARANTIRANILINE.—Some home inquiries. Price 2s. 3½d. lb., delivered.

PARA NITROACETANILIDE.—Some home inquiry. Price 3s. 9d. lb., delivered.

PHENYL PERI ACID.—Export inquiry. Price 5s. 10d. lb., f.o.b.

SULPHANILIC ACID.—Small home inquiry. Price 11d. lb., 100% basis, carriage paid.

SCHAEFFER SALT.—Small home inquiry. Price 3s. 11d. lb., 100% basis, delivered.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

PRICE LISTS, ETC., FOR GENERAL MERCHANDISE IN CHINA.—A British merchant firm established at Tientsin desires to receive from British manufacturers catalogues, price lists and samples of the following goods:—Paints, varnishes, calcium, carbide, quinine, borax crude, and refined, colours and dyes, etc. Ref. No. 368.

PRICE LISTS FOR THE ARGENTINE.—A British firm, who has received inquiries from its branch in the Argentine, desires to receive lowest prices, c.i.f., Buenos Aires, for the following:—Arsenic, sulphur, soda, paints, varnishes. Ref. No. 391.

CHEMICALS FOR SWEDEN.—A firm in Halmstad is desirous of securing representation for Sweden of Brtish manufacturers of chemicals, particularly such as are employed in the glass making industry. Ref. No. 375.

DEMAND FOR TALLOW IN SOUTH AFRICA.—H.M. Senior Trade Commissioner in South Africa reports that the South African Railways and Harbours Administration are calling for tenders to be presented by May 5 for the supply and delivery of tallow during the period July 1, 1924, to June 30, 1925. Ref. No. D.O.T. 13428/E.D./C.C./2.

American Technical Books

THE McGraw Hill Publishing Co., the proprietors of *Chemical and Metallurgical Engineering*, our American contemporary, have just issued their list of books on chemical and allied subjects from their London office at 6, Bouverie Street, E.C.4. The list contains an excellent range of text books and standard works by leading American authorities on organic and inorganic chemistry, analysis colloids, metallurgy, thermodynamics, fuel, petroleum, sulphuric acid production, chemical warfare, etc. A feature which is worth noting in these days is the reasonable prices at which the majority of the books are issued.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, April 3, 1924.

THERE has been little or no improvement in the demand for chemicals on this market during the past week. Home trade buyers are not doing much more than nibbling, a hand-to-mouth policy, with purchases sufficient to cover immediate needs, apparently being the order of the day. A moderate amount of overseas business has been done and small parcels have recently been sent across to the Continent. Australia and Canada, however, with a little trade on Indian account, continue to be the principal export outlets.

Heavy Chemicals

Sulphide of sodium values are easy in the absence of any business worth mentioning; 60–65 per cent. concentrated solid is quoted at £14 15s. per ton, and crystals at £9 5s. Prussiate of soda is also quiet and rather weaker, prices ranging round 5d. per lb., though a fraction under this figure has been mentioned. Alkali continues fairly active, both for home consumption and for export, values being steady at £6 15s. per ton for 58 per cent. material. Saltcake is maintained at about £4 10s. per ton for the home trade; a quietly steady export business is being put through. Glauber salts are about unchanged at £3 10s. per ton, though no improvement in buying interest can be reported. Chlorate of soda is only in quiet demand and quotations are easy at 2½d. to 2¾d. per lb. Caustic soda keeps steady at from £16 17s. 6d. for 60 per cent. strength to £19 7s. 6d. per ton for 76–77 per cent.; a fair amount of business, both on home and export account, is being put through. Hyposulphite of soda continues dull and easy at £15 per ton for photographic crystals, and £9 5s. for commercial. Phosphate of soda still attracts little attention and values are easy at about £13 10s. per ton. Nitrite of soda is well maintained at £28 to £28 10s. per ton. Bleaching powder is rather quiet but steady at £10 per ton. Bicarbonate of soda is a moderately active section and values are steady at £10 10s. per ton. Bichromate of soda continues in fair demand at 4½d. per lb. Soda crystals are unchanged at £5 5s. per ton, the demand being quiet. Acetate of soda is not particularly active, but current quotations are steady at round £24 per ton.

Both caustic and carbonate of potash attract less attention, and values, though about unchanged, are easy; 90 per cent. caustic potash is offering at £29 per ton and carbonate at £24 10s. Bichromate of po ash keeps steady and in fair demand at 5¾d. per lb. The demand for chlorate of potash is on the quiet side, and prices have an easy tendency at 2¾d. per lb. Permanganate of potash is inactive but about unchanged from last week at 7½d. to 8½d. per lb, according to quality. Yellow prussiate of potash is quiet but fairly steady at 8½ per lb.

Export inquiry for arsenic for future shipment is said to be fairly good, though actual business is still only moderate; values are easy but about unchanged at £64 per ton, Manchester, for white powdered, Cornish makes. Sulphate of copper continues rather dull at £24 to £24 10s. per ton, f.o.b. Commercial Epsom salts are in moderate request at £4 10s. for British, with magnesium sulphate, B.P. quality, offering at £6 10s. per ton. Acetate of lime is inactive at £20 for grey and £14 10s. to £15 per ton for brown. Acetate of lead is only a quiet section, but values are very firm; white is now quoted at up to £51 per ton and brown at £48. Nitrate of lead is steady at £43 to £44 per ton, though buying interest is not of much account.

Acids and Tar Products

Tartaric and citric acids are comparatively quiet; values, however are maintained at last week's levels. Tartaric is offering at round 1s. 1½d. per lb. and citric at 1s. 5½d. Oxalic acid is dull and easier at 5¼d. per lb. Acetic acid is in quietly steady demand at £47 10s. per ton for 80 per cent. commercial and £70 for glacial.

Actual business in pitch is very subdued and values are easy, ranging from £3 to £3 5s. per ton, f.o.b., Manchester. Naphthalenes are not attracting much attention; refined grades are offering at £16 to £17 per ton, and crude at £7 to £10. Solvent naphtha is steady and in fair inquiry at 1s. 4½d. per gallon. Creosote oil is quiet and easy at 8¼d. per gallon. Carbolic acid is nominally unchanged at 2s. 3d. per gallon for crude and about 8d. per lb. for crystal.

Company News

RIO TINTO CO.—The directors announce a final dividend for the year 1923 of 25s. per share, less tax, making 35s. per share for the year, carrying forward £441,058.

BRITISH GLUES AND CHEMICALS LTD.—The directors announce that payment of the dividend on the 8 per cent. preference shares, due on Wednesday last, has been postponed.

OLYMPIC PORTLAND CEMENT CO., LTD.—The net profit for the year 1923 is £70,237, which, with £19,727 brought in, makes a total of £89,964. The directors recommend a final dividend of 7½ per cent., less tax, making 12½ per cent. for the year, carrying forward £19,783.

NEW TAMARUGAL NITRATE CO., LTD.—The directors, it is announced, will recommend to the shareholders at the annual general meeting, to be held on April 16, a final dividend of 25 per cent., less tax, making 35 per cent. for the year, to July 31, 1923. For each of the two preceding years the dividend was 15 per cent.

BRITISH DYESTUFFS CORPORATION, LTD.—After providing £360,025 for depreciation, and crediting the final amount recoverable in respect of excess profits duty, the profit for the year to October 31, 1923, is £251,422. The balance of loss brought in from the previous period amounts to £700,698, leaving to be carried forward a deficit of £449,276. The annual general meeting will be held at Milton Hall, 244, Deansgate, Manchester, on April 8, at 11 a.m.

ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD.—The accounts for the year 1923 show that, after providing for the full year's preference dividend and £218,600 for depreciation, reserves and sinking funds, a balance remains to be carried forward of £227,478, against £227,440 brought in. The directors regret that they are unable to recommend payment of an ordinary share dividend. For each of the two preceding years 5 per cent. was paid on the ordinary shares.

RECKITT AND SONS, LTD.—At the annual general meeting of shareholders held on March 28, the directors reported that sales and profits had been more than maintained, and a final dividend of 1s. 6d. per share was declared, making 3s. 6d. (17½ per cent.) for the year, the same as for the preceding year. The sum of £200,000 was transferred to reserve, bringing the total fund up to £1,200,000. A prosperity bonus of £55,000 was allocated to employees, and a balance was carried forward of £223,000.

WRIGHT, LAYMAN AND UMNEY, LTD.—The report for the year 1923 states that, after providing for staff bonus, bad debts, depreciation, etc., there is a trading profit, including income from investments, of £29,008. After adding £8,806 brought forward, there remains to the credit of profit and loss account £37,815. The directors recommend a final dividend of 15 per cent. on the ordinary shares, making 25 per cent. for 1923, and a bonus of 2s. per £1 share on the ordinary shares, transferring £5,000 to the reserve fund, leaving £6,135 to be carried forward.

BELL'S UNITED ASBESTOS CO., LTD.—The directors report for the year ended December 31 last states that the result of the year's operations is a net profit of £36,525, to which has to be added the amount brought forward of £37,911, making a total of £74,436. After paying the preference dividend, the directors recommend a dividend on the ordinary shares of 1s. 6d. per share, making 10 per cent. for the year, and that £10,000 be placed to reserve, leaving £31,483 to be carried forward. The annual meeting will be held at the Cannon Street Hotel, on April 10, at 2 p.m.

TARMAC, LTD.—The annual meeting will be held at the Queen's Hotel, Birmingham, on April 10, at 2.15 p.m. The net profit for the year 1923, after providing for taxation and including £3,735 interest on advances to and dividends received from subsidiary undertakings, amounts to £91,572, which, with £14,285 brought in makes a total of £105,857. The directors' fees absorb £3,500; a sum of £17,445 is placed to depreciation and a final dividend of 2s. 3d. per share, free of tax, making 15 per cent. for the year, is recommended; £7,500 is added to general reserve, leaving £17,413 to be carried forward.

LEVER BROTHERS, LTD.—The report of the directors for the year 1923 states that the balance of £5,071,978 standing to the credit of profit and loss account, after providing for repairs, renewals and alterations, depreciation and insurance, has been appropriated as follows: Dividend on 7 per cent. preference shares, £1,685,716; on 8 per cent. "A" preference shares, £1,238,788; on 20 per cent. preferred ordinary shares, £660,750; on 20 per cent. "A" preferred ordinary shares, £600,000; on 20 per cent. "B" preferred ordinary shares, £65,407; and on 8 per cent. preferred ordinary shares, £76,197; co-partnership dividends, £197,427; dividend on ordinary shares of 10 per cent., £240,000; to reserve, £250,000; carried forward, £57,693. The balance-sheet shows that the item of £476,680 which appeared in the balance-sheet at December 31, 1922, under the heading of discount on debenture stock and expenses of issue, has been written off the eserve fund. For the preceding year the balance of profit was £4,625,018, and the dividend on the ordinary shares was 10 per cent. The annual general meeting will be held at the Lyceum, Port Sunlight, Cheshire, on April 10, at noon.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, 51 and 52, Chancery Lane, W.C.2, from whom further information may be obtained. (Opposition to the Registration of the following Trade Marks can be lodged up to April 19, 1924.)

"DURALAC."

B442,313. For paints, enamels and varnishes, Orr's Zinc White, Ltd., Vine Chemical Works, Lugsdale Road, Widnes, Lancashire, and 1, Leadenhall Street, London, E.C.3., zinc white manufacturers. November 5, 1923. User claimed from May 17, 1917.

"TETRAFORM."

445,574. For chemical substances prepared for use in medicine and pharmacy. The British Drug Houses, Ltd., 22 to 30, Graham Street, City Road, London, N.1., wholesale druggists. February 21, 1924.

445,457. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Percy William Farmer, 3, New Street Square, London, E.C.4.; manufacturer. February 15, 1924.

"CUPREX."

444,029. For chemical substances used for agricultural, horticultural, veterinary and sanitary purposes, but not including ointments, and not including any goods of a like kind to ointments. The firm trading as E. Merck, Frankfurterstrasse 250, Darmstadt, Germany, merchants. December 31, 1923. (To be Associated, Sect. 24.)

"CUPREX."

444,030. For chemical substances prepared for use in medicine and pharmacy, but not including ointments, and not including any goods of a like kind to ointments. The firm trading as E. Merck, Frankfurterstrasse 250, Darmstadt, Germany, merchants. December 31, 1923. (To be Associated, Sect. 24.)

"ARCANOL."

444,324. For chemical substances prepared for use in medicine and pharmacy, but not including ointments, and not including any goods of a like kind to ointments. Chemische Fabrik Auf Actien (vorm E. Schering) (a Joint Stock Company organised under the laws of Germany), Mullerstrasse 170 and 171, Berlin, N.39, Germany, manufacturers. January 10, 1924.

B. 444,657. Acetanilide, acetyl salicylic acid (aspirin), acetphenetidine (phenacetin), acidum carbolicum liquifactum, allantoin, carbolic acid crystals, chloral hydrate, cresylic acid, cresols, glauber salts, glycerophosphoric acid (and its salts), liquid cresylic antiseptic preparations or compounds, phenolphthalein, picric acid, salicylic acid, salol, sodium salicylate, thymol, saccharin, vanillin, sulpho-carbolates of zinc and sodium and meta xylenol, all being chemical substances prepared for use in medicine and pharmacy. The Graesser-Monsanto Chemical Works, Ltd., Chemical Works, Oil Works Road, Cefn, Ruabon, North Wales; and 39, Billiter Buildings, Billiter Street, London, E.C.3; chemical manufacturers. January 22, 1924. User claimed from December 13, 1920.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

GRIFFITS, Mr. H. P., La Lumiere, Arlington Road, Twickenham, spirit rectifier. (C.C., 5/4/24.) £19 13s. 6d. February 7.

HODSON, Frank, Ousebridge House, Carlton, fertiliser manufacturer. (C.C., 5/4/24.) £10 6s. 8d. February 20.

LION ESSENCE AND CHEMICAL CO., LTD., 13, Guildford Road, Brighton, chemists. (C.C., 5/4/24). £16 17s. 6d. January 23.

VAPURO, LTD., 127, Gray's Inn Road, W.C., chemical manufacturers. (C.C., 5/4/24.) £13 16s. 6d. February 19.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

LAWS, STRACEY AND DYMOND, LTD., Watford, manufacturing chemists. (M., 5/4/24.) Registered March 19, £4,000 debentures; general charge. *Nil. July 16, 1923.

Satisfaction

LEWIS AND BURROWS, LTD., London, E.C., chemists. (M.S., 5/4/24.) Satisfaction registered March 24, £1,200 (not ex), registered March 28, 1914.

London Gazette

Winding Up Petition

CORNWALL'S INDUSTRIES, LTD. (W.U.P., 5/4/24.) A petition for winding-up has been presented by Burnden Tar Co. (Bolton), Ltd., Hulton Chemical Works, Bolton, and Joseph Anderson Hutchison, of the Hulton Chemical Works, Bolton, creditors, and is to be heard at the Royal Courts of Justice, Strand, London, on April 15.

New Companies Registered

BOULTON AND MEDCALF, LTD., 20, Byward Street, London, E.C. Chemical manure manufacturers, etc. Nominal capital, £3,000 in £1 shares.

EDWIN BROOK AND CO., LTD., Victoria Dyeworks, Honley, near Huddersfield. Dyers. Nominal capital, £10,000 in £1 shares.

OLIVER BROWN, LTD., St. Mark's Road, Mitcham, Surrey. Manufacturers of and dealers in varnishes, enamels, polishes and colours of all kinds, chemists, oil and colourmen, etc. Nominal capital, £10,000 in £1 shares.

ENGLISH BEET SUGAR CORPORATION, LTD. To carry on the business of cultivators of sugar beet and other produce of the soil; manufacturers and refiners of and dealers in all kinds of sugar and sugar products, etc. Nominal capital, £500,000 in 50,000 6 per cent. cumulative participating preference and 450,000 ordinary shares of £1 each. Solicitors: Morris, Veasey and Co., Ellerman House, 19–21, Moorgate, London, E.C.

ILEYS, LTD., 34, Ryhope Street, Ryhope, Durham. Wholesale and retail chemists, druggists, etc. Nominal capital, £1,000 in £1 shares.

LANGHAM CHEMICAL CO., LTD., 132, Great Portland Street, London, W.1. Chemical manufacturers, etc. Nominal capital, £100 in £1 shares.

LESLIE ALLEN AND CO., LTD. Distillers of petroleum and tar products, manufacturers of lubricating oils and greases, etc. Nominal capital, £30,000 in £1 shares. Solicitors: Gee and Edwards, St. Mary Street, Swansea.

METAL, ORE AND CHEMICAL CO., LTD., Bilbao House, New Broad Street, Bishopsgate, E.C. Manufacturers and brokers of and dealers in all kinds of metals, ores, minerals, chemicals and chemical substances, etc. Nominal capital, £10,000 in £1 shares (9,000 8 per cent. cumulative preference, 250 founders and 750 ordinary).

SULPHATE OF AMMONIA EXPORT TRADERS, LTD., 16, Mark Lane, London, E.C. To import, export, deal in and provide storage for sulphate of ammonia, etc. Registered on March 28, as a company by guarantee and not having a share capital, with an unlimited number of members each liable for £1 in the event of winding up.

YORK RAISING AND DYEING CO., LTD., Reservoir Mills, Ardley Street, Beswick, Manchester. Dyers and bleachers, chemical manufacturers, etc. Nominal capital, £32,000 in £1 shares.

Development of Radium Ores in Australia

It is not generally known that Australia possesses what are probably the richest deposits of radio-active uranium ore in the world. There are two deposits which are located in S. Australia, discovered many years ago, and are in lode formation, with a high percentage of carnotite (uranium oxide). A company which was formed to work the ores in 1912 abandoned operations after a short time, but towards the end of last year a new company under the name of the Radium and Rare Earths Treatment Co., was formed in Melbourne to exploit these radio-active ores. The directors of the new company are:—Dr. A. J. Bull, of Melbourne University; Dr. H. Flecker, a well-known radiologist, of Melbourne, and Messrs. W. Roberts (chairman) and A. Bowler. The services of Sir Douglas Mawson, lecturer on metallurgy, and also of Dr. Cooke, a qualified metallurgical chemist, of Adelaide University, have been secured by the directors of the Radium and Rare Earths Treatment Co. Sir Douglas Mawson will shortly visit the mine and make a survey of the lodes, a geological examination, and a complete sampling with a microscopic, petrological study of the ores and their mineral contents. Dr. Cooke will make investigations as to the most economic method of chemical treatment of selected products from the lodes. The laboratory methods, as advised by him, will be transferred to large scale operations. Sir Douglas Mawson and Dr. Cooke have had considerable experience in research work on these ores, and their investigations lead them to believe that the ores can be successfully treated in South Australia.

Tariff Changes

BRAZIL.—A recent Decree approves Regulations regarding the sale of insecticides and fungicides in the Republic. The Regulations prohibit the sale or exposing for sale of insecticides or fungicides, or chemical products destined for the same purposes, under conditions which deceive the purchaser regarding (*a*) nature or origin, (*b*) composition or proportion of the useful elements, (*c*) the use of a name usually given to other substances of insecticidal or fungicidal action. All containers must be visibly marked with the officially recognised sign for poisons. All merchants and importers of fungicides and insecticides must, before putting them on sale, communicate to the Institute of Chemistry particulars of the fungicides and insecticides which they propose to sell, together with the commercial name or mark to be used to distinguish the article from similar products, and a copy of the analysis of the product. The text of the Regulations (in Portuguese) may be seen by persons interested on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.